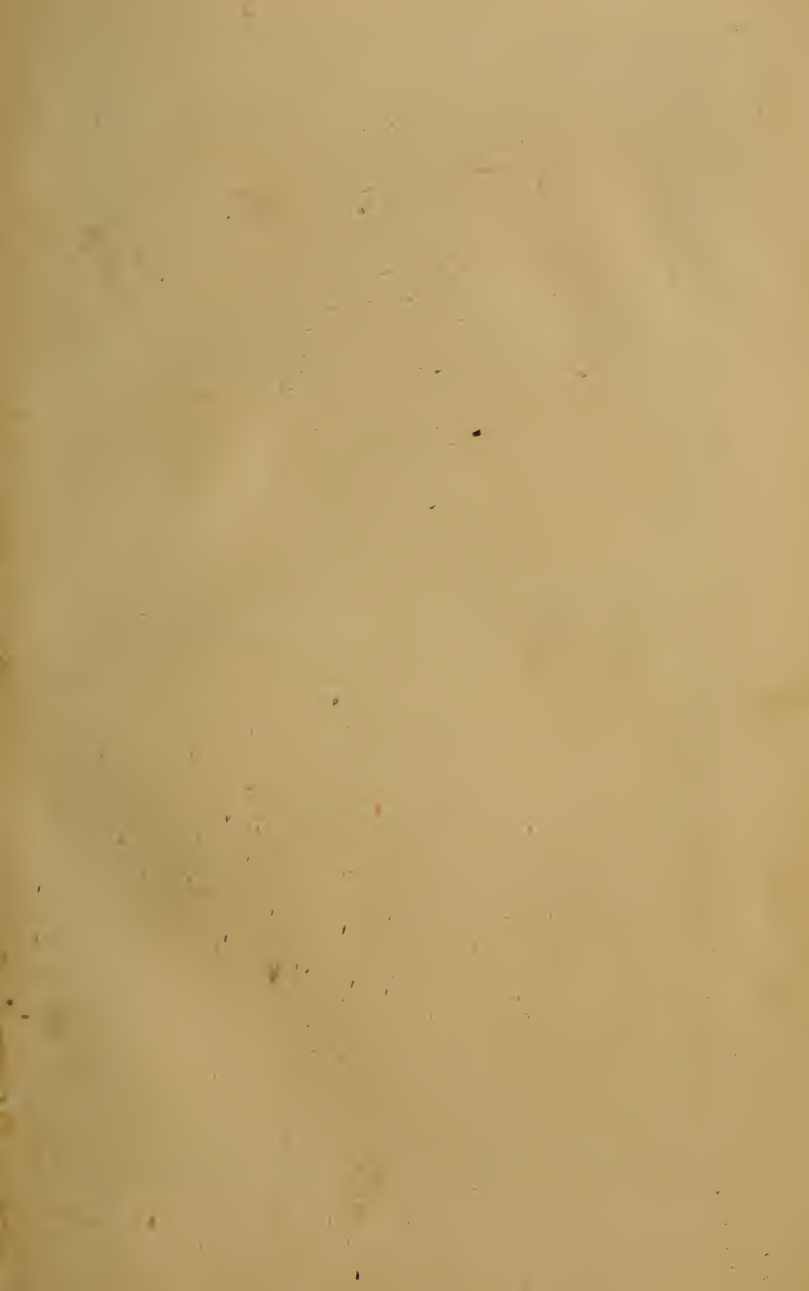


A 28.E.1858.1.

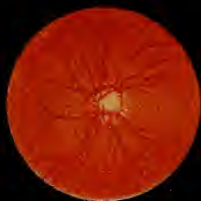


Charles A. Oliver.





1



2



3



4



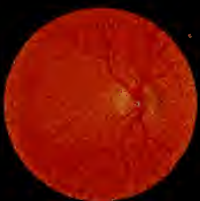
5



6



7



8



Charles A. Huer.

THE

OPHTHALMOSCOPE;

ITS MODE OF APPLICATION EXPLAINED, AND ITS VALUE
SHOWN, IN THE EXPLORATION OF

INTERNAL DISEASES AFFECTING THE EYE,

BY

JABEZ HOGG,

ASSISTANT SURGEON TO THE ROYAL WESTMINSTER OPHTHALMIC HOSPITAL;
VICE-PRESIDENT OF THE MEDICAL SOCIETY OF LONDON;
MEMBER OF COUNCIL OF THE MICROSCOPICAL SOCIETY, LONDON;
ETC.

AUTHOR OF
THE MICROSCOPE, ITS HISTORY, CONSTRUCTION, AND APPLICATIONS;
ELEMENTS OF NATURAL PHILOSOPHY; ETC.

"These eyes, though clear
To outward view of blemish or of spot,
Bereft of light, their seeing have forgot."

SECOND EDITION.

LONDON:

JOHN CHURCHILL, NEW BURLINGTON STREET.

1858.

Gift of Dr. J. H. H. of Philadelphia, May 21, 1880.

HARVARD UNIVERSITY
SCHOOL OF MEDICINE AND PUBLIC HEALTH
LIBRARY

A 28.E.1858.1.

PREFACE.

MY apology for reprinting this fragmentary Essay on the Ophthalmoscope—which I read before the Medical Society of London, last session, and which subsequently appeared in the pages of the *Lancet*, 1857—is, shortly, that I believe the instrument destined to open out a new era in ophthalmic medicine; and that, by the publication of this treatise, I may assist in diffusing among the profession a knowledge of its practicability and usefulness in the diagnosis and treatment of some obscure forms of eye disease.

I am sensible of many short-comings and imperfections, for which I crave indulgence; nevertheless, I trust what I here present to the notice of the profession will prove of some value, and as generally illustrative of the use of the instrument in clearing up embarrassing points of diagnosis, and in detecting the earliest indications of change in the delicate tissues of the eye. And thus, when aided by the light of physiological and pathological science, we may find a sufficient stimulus to renewed exertion, which will ultimately reward us with success.

A demand for my book far beyond my most sanguine expectations, having exhausted the first edition, the opportunity has not been lost for making a careful revision of its pages. At the same time I have sought, by the addition of new matter, to render this, my second edition, more acceptable to the practitioner, and student of Ophthalmic Medicine and Surgery.

6, Gower Street,
October, 1858.

DESCRIPTION OF FRONTISPIECE.

1. The healthy eye of a boy, age 14 ; iris blue.
2. Disorganised vitreous, with a crescentic-shaped body ; believed, by Ruete, to be a *Cysticercus*.
3. Retinitis, with exudation, exposed optic nerve, and a dull foggy appearance of the fundus of the eye ; after Ruete.
4. Effusion, œdema of retina, with diffused black patches surrounding the periphery of the optic nerve, extravasated blood covering the *papilla optica*, and red patches are distributed throughout the upper portion of choroid, with bluish-white plastic exudation beneath the vessels ; (?) detached portion of retina : after Ruete.
5. Hpdrophthalmia, with effusion which displaced the optic nerve, and communicated a bluish-grey colouring to it ; after Ruete.
6. Amblyopia of left eye, and congestion of retina, which somewhat impaired its transparency ; after Wharton Jones.
7. Amblyopia, hæmorrhagic deposit over *papilla optica*, and exposed pigment around the periphery of optic nerve.
8. Congestion of retina and choroid ; ophthalmia interna posterior.

The wood-cuts printed in the text imperfectly represent the appearances described.

THE
OPHTHALMOSCOPE
OR
SPECULUM OCULI.

DISEASES of the eye, from their immense variety, and their too frequently calamitous results, present claims to careful and assiduous investigation, perhaps more urgent than those of any other organ. And if the modern advance of ophthalmic surgery is at least equal to the progress of surgical science in general, there is still room for improvement. The peculiar structure of the eye, its frequent exposure to accidents, and its manifold forms of disease, call loudly for the diligent use of all the resources of science, both in *diagnosis* and *treatment*. Indeed, as regards the former of these, as in every department of medical science, too much time can scarcely be given to the study of symptomatology, whereby we are enabled to arrive at a just conclusion regarding the true nature of disease; and in so far as we are able correctly to interpret symptoms, and to trace out, in connexion with them, a real change of structure or of function which affords an adequate explanation of their presence, in so far are we

prepared to form a correct diagnosis of each and every case brought to our notice.*

An accomplished and able physician has most truly said, "that the great secret in treating eye cases—the secret without which everything else must fail—is to know and discriminate the various states of disease to which the eye is subject. The successful removal of eye diseases depends almost entirely on accurate diagnosis. Discover what the disease is, make out accurately the pathology of the case before us, make out the *rationale* of the symptoms, local and general, and, if the case be curable, the cure is generally simple. Confound many different diseases, *huddle* them promiscuously together under a few general and perhaps unmeaning terms, and to a certainty we shall *mistreat* some of them."†

It must be admitted that these remarks most forcibly apply to a certain class of eye diseases hitherto *huddled* under the names of amaurosis, glaucoma, &c.; the treatment of which is often only *mistreatment*, and frequently places these maladies in the list of incurables. This deficiency in ophthalmic surgery has been long felt by the profession, and means have

* "Diseases being very different in their nature, and requiring very different kinds of treatment, it is self-evident that all successful attempts to modify a disease by art, must rest on physical diagnosis; that is to say, the recognition of diseases by physical marks, or rather the knowing what particular affection we have to treat. If a disease is subjected to wrong treatment under a false name, the result may be most lamentable."—Forbes.

† Dr. Mackenzie.

been sought to remedy it. The attainment of this desirable end has been at length accomplished, by the invention of a simple but ingenious instrument, called the ophthalmoscope, by which the internal structure of the eye can be thoroughly examined, and eventually must effect important changes in our views, assist greatly in our diagnosis of diseases affecting the internal structures of the eye, and thereby enable us to arrest, and more frequently cure, many cases now believed to have passed out of the power of the healing art. I propose, then, to give a brief history of the instrument, and afterwards illustrate its value by cases I have examined and treated at the Royal Westminster Ophthalmic Hospital, in private practice, and from other reliable sources.

The earliest observation, and which doubtless led to the discovery of the ophthalmoscope, was the mirror-like reflection of light seen to emanate from the eyes of certain animals.* Prevost demonstrated, in 1810, that this was produced by a ray of light falling upon the eye; and, being reflected back, gave the eye that mirror-like appearance, to see which perfectly, the animal must be in a darkened place, and the light made to fall upon it from without. This observation has only lately been revived and studied by Cumming, Beer, Erlach, Helmholtz, Brücke, and others, in the human eye. Beer tells us that the rays of light must be made to fall very

* "There is nothing more easy than to see the vessels of the retina in a cat's eye without an ophthalmoscope. Having previously dilated the pupil by atropia solution, drop some water into the eye while the eye-lids are held apart, and cover the cornea with a thin plate of glass. The vessels of the retina can then be seen slightly magnified."—W. Jones.

obliquely into the eye, and the observer be placed on the same plane, or nearly parallel with the eye. Cumming observed that this object could only be attained in a darkened room, with a candle, or other light, placed about eight or ten feet before the eye to be made the subject of the experiment. Babbage was, perhaps, the first to mention the use of a small mirror with "*a small portion of silver removed from the centre ;*" but he here stopped short and did not carry out his own idea. If he employed a mirror, or in any way carried out his own suggestion, no record of it is to be found. Our countryman, Mr. Cumming, twelve years ago, pointed out the existence of a reflection from the back of the human eye, and distinctly recognised the significance of the discovery. In the twenty-ninth volume of the *Medico-Chirurgical Transactions* (1846), will be found a paper, by Mr. Cumming, "On the Luminous Appearance of the Human Eye," which contains the following passages :

"The establishment of the fact of a similar reflection from the healthy human eye to that from the eyes of animals, appears to me chiefly important in its adoption as a mode of examining the posterior part of the eye. The retina and choroid hitherto concealed in the living eye, and little opportunity being afforded of examining their condition after life, in consequence of their diseases, ascribed to these structures ; but the existence of this luminosity, its non-existence, or abnormal appearance, may enable us to detect changes in these structures heretofore unknown, or satisfactorily to see those which we only suspected. If we dilate the pupil by atropia, we have a means afforded of seeing the condition of the retina and choroid in every case.

“The only circumstances necessary for observing the interior of the eye, are—first, that the eye must be placed at some distance from the source of light, the distance being greater as to the intensity; second, that the rays of light diffused around the patient, and sometimes around the eye itself, be excluded; third, that the observer occupy a position as near as possible in a direct line between the source of light and the eye to be examined.

“Let the person to be examined sit or stand eight or ten feet from a gas-light, looking a little to the side; then approach him in a direct line, and at once will be seen the reflection of the bottom of the eye. If solar light be admitted through a closed shutter into a dark room, the patient standing five or six feet in front of the aperture, approach him as before indicated, when the luminosity of the interior of the eye will be immediately perceived.

“On approaching within a few inches of the eye, the reflection is not visible; for before the eye of the observer can be brought within range of the reflected rays, the incidental rays of light are excluded.

“In cases in which the lens had been removed, the reflection was indistinct at a distance, but was rendered clearer by the aid of a double convex lens placed before the eye under examination; but, at two or three feet distant, the reflection was as obvious as in cases in which the lens was present.

“The brilliancy of the luminosity of the healthy eye appears to be in proportion to the light colour of the pigment; for, upon examining the eye of an Albino, by placing close to the eye a black card with an aperture a little larger than the

pupil, the reflection was little brighter than that of a fair person examined side by side, but was of a more decided pink colour."

Mr. Cumming then proceeds to inquire into the source of this reflection :

"The retina in the living eye is a perfectly transparent medium in contact with the choroid or vitreous body. The transparency of the retina is, however, no proof that it does not itself reflect many of the rays of light that impinge upon it, although the greater proportion are transmitted: the transparency of a structure being quite consistent with considerable reflection, but not with absorption of the rays of light; and thus reflection would be rendered more obvious by the position of the choroid."

Mr. Bowman, however, suggested that the choroid, with its pigmental layer, was the reflective structure, and not the retina alone. To this conclusion our author, after having made numerous experiments, also arrived; for he says, further on in his paper: "I regard the choroid as the principal reflecting structure; the light returned from the retina and concavity of the hyaloid body as increasing the effect; the concentrating influence of the concave shape of the retina, and the focal distance of the lens, greatly increasing the brilliancy of the reflection."

No notice seems to have been taken of Mr. Cumming's experiments in this country, but the following year they chanced to meet the eye of M. Brücke, Professor of Physiology at the University of Vienna. Here, with great opportunities for studying the phenomena referred to, he, with Helmholtz,

eventually succeeded in perfecting the form of the instrument, now known as the speculum oculi or ophthalmoscope. Desmarres, in his *Traité des Maladies des Yeux*, gives all the credit to the latter, who, he tells us, invented the instrument in 1851, which has since received its various modifications from Jaeger, Ruete, Coccius, Anagnostakis, Donders, and others. Helmholtz, it is said, founded his instrument on experiments made by Erlach with a microscope slide; it consists of plain reflecting pieces of glass. Dr. Ruete, of Liepsic, was the first to employ a concave mirror.

Ruete, having devoted himself to the investigation of the internal changes of the tunics of the eye with his instrument, published, in 1854, a most valuable Monograph, which he illustrated with carefully coloured drawings of the cases examined by him. Ruete's ophthalmoscope is rather complicated and difficult of use; he tells us indeed that "he prefers, to his own, for irritable and inflamed eyes," the simpler forms of instruments, designed by either Professor Helmholtz or Coccius; and, for all purposes, the concave mirror is preferable and more generally useful, offering, as it does, facilities for the adaptation of either concave or convex lenses, of different powers, suitable to each particular case. "The dispersion of the rays of light is greatly increased," observes Ruete, "by using the concave lens with the mirror, and we are thus enabled to view a great portion of the back of the eye, the optic nerve, and vessels of the retina." When a concave lens is used, it is as if we viewed the fundus oculi with a Galilean telescope; when one or two convex lenses, it is as if we viewed it through the more modern astronomical telescope.

Ruete's illustrations are very characteristic, well-marked changes of structure; a few drawings from his Atlas are reproduced in my frontispiece.

The ophthalmoscope I make use of is a small circular mirror, indeed nothing more than the silvered mirror made for an ordinary microscope, having a hole bored in its centre, and mounted in a piece of tortoiseshell.* This form of instrument is generally known as that of M. Anagnostakis. I have also tried the plane perforated mirror of M. Coccius, M. Jaeger, and a small portable instrument, so contrived, with the lamp fixed in position, as to be always ready for use; but I give preference to the simplest form, finding it infinitely more convenient to hold a small instrument in my hand, which I can bring near to my patient, and turn about in any direction, as necessity may dictate. The mode of using the instrument is shown in the annexed diagram (Fig 1). The rays from the

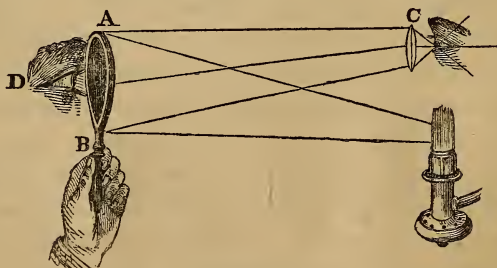


FIG. 1.

* This ophthalmoscope may be purchased at Baker's, 244, Holborn; Mathews's, Portugal Street; and Weedon's, Hart Street, Bloomsbury.

flame of the lamp, reflected by the concave mirror, A B, fall in a state of convergence on a convex lens, C, in front of the eye under examination. The rays of light are so much converged by the additional refraction they undergo on entering the eye, that they quickly come to a focus, cross, and are dispersed over the retina, and thus this membrane is fully illuminated. The observer's eye at D is looking through the small central aperture in the middle of the concave mirror, which he holds in his hand. In the examination of most eyes, we find it necessary to use a bi-convex lens, C, of about one-and-a-half inch focus. The rays coming from the lamp are inverted as they quit the concave mirror—an inverted image of the flame is presented to the eye—but as the rays cross behind the pupil, the image thrown upon the retina is an erect image of the flame. A convex lens held close in front of the eye observed, magnifies the erect image; but if it is moved away from the observed eye, the image on the retina is inverted. The optic nerve will now change its place, and be seen towards the temple, instead of towards the nose.

The patient, whose eye is about to be examined, should be taken into a darkened room and seated by the side of a table, on which is placed an ordinary candle, or, what is better, a lamp. The lamp may be brought somewhat near to the patient's ear, and the flame so arranged that it shall keep the patient's eye in the shade and be in a straight line with it, but lower than the eye of the observer, who is seated in front of the patient, on a stool capable of being raised. As a rule, it is better to sit a little higher than the patient. The reflecting surface of the instrument is then to be turned towards the

patient's eye, in such a way that the eye of the surgeon, when looking through the small central hole, may see, upon turning the instrument a little inwards, a luminous reflection of its interior. On withdrawing it gradually, the reflection grows smaller, until it becomes oblong and very brilliant. The most conspicuous object at the fundus of the eye being the entrance of the optic nerve, this is the first point that should be sought for; and as it is situated towards the inner side, the patient must be directed to turn his eye so as to bring it directly in the line of vision. For this purpose, supposing it to be the left eye that is under observation, he should be directed to look at the tip of the observer's left ear, and *vice versâ* with the right. This will generally suffice; if not, a very slight increase of obliquity to the right or left will bring it into the proper position. The ophthalmoscope may be held at first about eighteen inches distant, and slowly brought forwards until by slight movements backwards and forwards, the exact focus has been obtained. If, as often happens, an image of the lamp should be formed on the lens exactly in front of the pupil, it may be got rid of by turning it slightly on its axis, either vertically or horizontally. It is in this way, or slightly modified according to circumstances, that the alterations in the several structures of the eye may be studied.

There are one or two little practical details which the beginner will do well to observe. In the first place, during an examination, the *right* eye (supposing the left to be used in looking through the aperture in the mirror) must watch the movements of the globe of the patient under examination, and the reflection of the mirror at the same time, to enable

him to keep the fundus in *situ*. The light should not be too strong; a moderate light is sufficient to note the appearances without producing fatigue to the patient. The light should make an angle of about twenty degrees with the observer; and for ordinary examinations, the concave mirror is to be preferred; but when a feeble light only can be borne, or we wish to direct our examination to the changes in the vitreous body, or the anterior part of the lens, then the plane mirror of Coccius is better suited to such cases. Each examination should be commenced without the convex lens; at first, nothing is seen but a confused orange-red field; but as the true focus is obtained, we see either the entrance of the optic nerve or a large blood-vessel, by following up which, the whole is brought into view. A very slight adjustment of the ophthalmoscope and lens will now sharply and clearly define the fundus, providing the humours of the eye are transparent.

I often hear of great fatigue, or an aggravation of symptoms, produced by the large amount of light thrown upon disorganized or delicate tissues. This can only arise in careless or inexperienced hands, and may very properly be designated an abuse of the instrument. Should an active inflammatory state of the iris or other membrane co-exist, the discomfort to the patient caused thereby is quite sufficient to protect the organ and prevent mischief.

It will be found, in the greater number of cases, when patients are taken into a darkened room, and a moderate lamp-light only used, the pupils dilate sufficiently for examination. The optic nerve is seen faintly tinged with pink, and from its centre—the papilla optica—emerge the artery and

vein of the retina; the arrangement generally being, an artery and vein pass upwards, and a similar pair downwards; both vessels then divide into many branches, and run on towards the periphery of the retina.—*See Frontispiece, Figure 1.* The red colour, in the healthy eye, varies in tint; and this is governed, as Mr. Cumming pointed out, by the complexion of the individual; in the fair, it is brighter, in the dark, it is more of a yellowish-brown. The redness is owing both to retinal and choroidal vessels, the former being distinctly seen branching on the uniform red field formed by the more vascular choroid, and perceptible through the transparent retina. The arteries are distinguished from the veins by lesser breadth and brighter colour. The mode of ramification of these vessels varies somewhat in different persons. The veins usually lie above or over the arteries, and accompany them, so far as regards the principal branches, in their further course. No vessel of any kind in the normal state of the eye covers the foramen centrale—yellow spot—at least so far as I have been able to make out.* In the examination of all objects lying

* The Editor of the Lancet, reviewing this treatise, says: “This concise and accurate account presents a strong contrast to the inaccurate and inflated one given by Demarres, who, in the last edition of his *Traité des Maladies des Yeux*, remarks:

“ ‘Cette papille dont je compare volontiers l’aspect à celui de la lune se détachant sur la ciel par une belle nuit, paraît faire une très légère saillie sur les parties environnantes, ainsi que semblerait le prouver une petite ombre portée sur un des côtés de sa circonférence, ombre dont la position varie suivant la direction de la lumière. Cependant il n’en est pas ainsi, car la papille est sur le même plan à peu près que la choroïde.’ ”

behind the lens, it must be borne in mind that we are looking through that body, and consequently what is seen is magnified. Then again, by using a magnifying-glass to examine the changes in the retina, or increase the illumination in the interior of the eye, allowance must be made for differences of intensity, as well as the size of the picture presented. I more particularly draw attention to this fact, as the illustrations

“We must, however, do the author the justice to say that, in a few pages further on, he qualifies his poetical description, and at page 778 tells us that—‘*La forme est rarement ronde ; elle est presque constamment un peu ovale dans le sens vertical ; quelquefois elle est aussi un peu anguleuse.*’ Then follows a description of the vessels proceeding from the papilla, which ‘*sont au nombre de quatre ou cinque, qui toutes viennent d’un trone unique ; les veins de même nombre le plus ordinairement, et ne se distinguent des artères que par un plus gros diamètre et une couleur plus brune.*”

Demarres surely was examining an unsound eye when he penned the above ; his description of the vessels is not at all in accordance with the latest investigations.

“The central artery of the retina, as soon as it enters the eye, divides into *two or three branches*, which subdivide and form a series of inosculations ; the branches pass forwards and form a complete vascular network, until the vessels become capillary, which they do suddenly from vessels of comparatively large size. At first the larger branches are on the inner side of the fibrous layer ; but as they pass forwards, they gradually penetrate this, some of the branches running parallel with the nerve fibres for a considerable distance ; but the smaller branches and capillaries, which form beautiful loops with each other, appear to be exclusively distributed in the vascular and granular layers, on the outer surface of the fibrous ; none, so far as can be detected, passing into the bacillar layer.”—Nunneley on the Retina. *Microscopical Journal*, July, 1858.

given in the text were made during examinations with a convex lens, and are consequently much enlarged.

The ophthalmoscope will often lead to the discovery of very slight changes in an eye otherwise pronounced, but erroneously, quite incurable. This was shown in cases which occurred in the Crimean war among the young soldiers, some of whom were malingering, and others might have been pronounced blind and unfit for duty, and placed on lists for pensions; in fact, in the absence of the ophthalmoscope, it would have been impossible to decide whether their cases were exactly as represented or not; whereas the use of this instrument at once cleared up doubts, showing slight extravasations of blood, and other changes not necessarily of an incurable character.

Before an estimate can be formed of the pathological changes revealed by the ophthalmoscope, it must be evident that the normal picture presented by the back-ground of the eye demands careful study; and the part borne by the different membranes in the production of this picture must be the subject of very particular consideration. Great difficulty will at first be experienced in the appreciation of a depression or a prominence, say of the papilla optica, which depends in part on the alterations produced in the light and shade of inverted images, and the difficulty must be increased when a convex lens is used with the perforated mirror.

I have repeatedly seen a drop of a weak solution of *atropia* produce in the healthy eye a very large amount of congestion of the retinal vessels, more than sufficient to deceive the practised eye of the surgeon, and which might well be mistaken for a diseased condition. On this account, I have

discontinued its use, and find no difficulty whatever, with the generality of patients, in causing sufficient dilatation of the pupil by simply allowing them to remain for a short time in a darkened room.

Nevertheless, I am free to admit that it would be next to impossible to investigate some cases without the use of this agent ; but, as a rule, I use it as little as possible ; believing, from its peculiar power over the iris, that it does produce congestion of the whole of the vessels to such an extent as to seriously embarrass a diagnosis. Atropia, to act on the pupils must be first absorbed, and then it exerts a powerfully paralysing effect on the third pair ; patients complain of the annoyance caused by such dilatation, which often continues for days. Should the sight from this time become worse, then in all probability the surgeon will be blamed, as the cause of aggravation of the disease.

I am aware that some difference of opinion exists with regard to the *action of Belladonna on the Iris*. The statements of eminent Physiologists in regard to the mode in which dilatation of the pupil is caused by belladonna is briefly as follows : According to some, the sphincter pupillæ is paralysed, and the dilator, being thereby no longer restrained, freely contracts. According to others, the dilator pupillæ is directly excited. Another opinion is, that belladonna acts by both paralysing the sphincter and exciting the dilator.

“ In agreement with Biffi, Cramer, and Ruiter, Budge has found that, after section of the sympathetic in the neck, and even after extirpation of the superior cervical ganglion, belladonna still exerts its dilating influence on the pupil,

though in a less degree. Dr. Harley, lately noticed that, after section of the sympathetic in the neck, by continuing the application of the atropia, the pupil becomes at last fully dilated.

“ If belladonna acted merely by paralysing the sphincter, we could not have such a result as this; seeing that the dilator, already so completely paralysed by section of its nerve, would not be in a condition to act spontaneously on the cessation of the antagonism of the sphincter. The result, however, is consistent with the opinion that belladonna excites the dilator pupillæ, if we admit that the drug comes by absorption to act on that muscle. The result is also not inconsistent with the supposition that belladonna acts both by paralysing the sphincter and exciting the dilator. Budge has cut both the oculomotor nerve and the sympathetic; nay, more, he has cut all the ciliary nerves, together with the optic, and still found the pupil to dilate distinctly under the influence of atropia. This result is entirely consistent with the opinion that belladonna acts both by paralysing the sphincter and exciting the dilator pupillæ.”*

Much difference of opinion has prevailed in this country with regard to the value of the instrument as a diagnostic aid.† This, doubtless, has arisen with those observers,

* Professor Wharton Jones, *Medico-Chirurgical Review*.

† “ Dr. Jago, who has written on ‘ Ocular Spectres,’ is very sceptical as to the possibility of muscæ volitantes becoming visible to another person. He more than hints that some of the ophthalmoscopists, who have described the ‘ shreds

who, on taking it up, find it to be very difficult to project the reflected light into the eye, and at the same time to bring the fundus into focus. Normal eyes, presbyopic and myopic eyes, all require particular care in doing so. The complication of a presbyopic or myopic condition of the observed eye, is also a source of difficulty; then, again, the complications of some of the foreign instruments tend to increase the difficulties, without offering any adequate advantage over the simple instrument I use. As with the stethoscope, and other instruments, the more simple, the more useful and manageable they are.

Many changes in the internal membranes of the eye may be seen by concentrating the light of a lamp with the convex lens alone. Dr. Mackenzie, in his work on Diseases of the Eye, 4th edition, page 583, mentions having discovered, in two patients, the effects of hyaloiditis, on directing the light

and flakes' they have seen in patients' eyes, have unwittingly written down the wonders of their own visual organs. We will not dispute the possibility of such confusion of ownership when inexperienced persons are using the ophthalmoscope; but with skilful observers it is impossible. If this were so, why then all eyes examined by the same ophthalmoscopist must give the same appearances of 'shreds and patches.' That it is so, every one who understands the use of this instrument can most positively deny. We suspect that the ophthalmoscope has not become familiar to Dr. Jago. When it has, we believe that he will admit abnormal conditions of the vitreous humour, which at present he rejects, and will promote the degraded muscæ to the position assigned to them by observers not inferior in reputation to himself."—*Medico-Chirurgical Review*, April, 1857, p. 431.

of a gas jet through the pupil with a lens. He informs us, also, that the state of the crystalline is fully recognizable by throwing ordinary daylight into the eye directly with a convex lens of from two to four inches focus ; and still more strikingly by lateral illumination, recommended by Liebrich, throwing in the light nearly in the plane of the iris with a convex lens of one-and-a-half-inch focus.

Dr. Bader has arrived at the following conclusions respecting ophthalmoscopic examinations :

“ 1. That the crystalline lens reverses the parts on the concavity round the entrance of the optic nerve (placing the yellow spot on the nasal side, &c.

“ 2. That only a limited space round the optic nerve (its radius not extending so far as the yellow spot) is open to accurate examination ; and that the choroid forms one uninterrupted red field.

“ 3. That the yellow spot is nearest that part of the optic nerve entrance which is freest from vessels, admits the greatest number of optic nerve fibres, and that, after having passed the entrance periphery, the vessels branch more towards the yellow spot than in any other direction.

“ 4. That the parts on the concavity, seen through the transparent media, are magnified about 100 diameters (probably by the crystalline lens).”

Mr. Dixon says : “ One very important fact should never be lost sight of by those who employ the ophthalmoscope : namely, that the mere concentration of a powerful light on the retina, if continued for more than a few seconds, does of itself place the part in an unnatural condition. In exploring

the internal ear, by means of artificial light, we may, indeed, concentrate the rays upon the tympanic cavity or its membrane to any amount, without injury to the parts illuminated; but the *retina*, so far from being a merely passive object of examination, is just the one tissue in the body which appreciates the intensity of the rays which fall upon it; and it must be borne in mind that the eye may be irritable and intolerant of light to an extreme degree, even although there may be a considerable diminution in its power of perceiving objects."

Although I am willing to admit that the retina is not "a merely passive object of examination" with this instrument, and that it is "just the one tissue of the body which appreciates the intensity of the rays which fall upon it," still I cannot agree with this gentleman in forbidding the use of the instrument for more than a few seconds at a time. The consequences dreaded from this concentration of light on the retina, have deterred many from using the instrument altogether; and this dread has even induced others to condemn it in toto, without ever giving it a trial. I have employed it in cases of hyperæmia of the retina, retinitis, choroiditis, and posterior ophthalmitis, and have *never* seen any evil consequence follow its use; and in not more than half a dozen out of the whole number of cases in which I have used it, have I found the patients complain of the intensity of the light, although the examinations were often continued long enough for me to sketch the diseased structures, and enable students to compare them after me.

Mr. Bowman speaks in the following terms of the invention of the ophthalmoscope: "an instrument, second to none

in the exploration of the physical condition of disease in parts not open to ordinary sight. It has laid open all the parts of the eye, so long as they remained transparent, which were situated behind the pupil, and which before were absolutely closed to inspection. Formerly one might conjecture the condition of the eye behind the pupil, and sometimes, by dilating the pupil with belladonna, get a dim insight into certain parts of the interior; but nothing was known of the structure of the retina during life from actual examination. With the ophthalmoscope everything near the axis of vision could be explored, if the media were clear; and if they were not clear, their opacity was thus disclosed."

My friend, Mr. Wharton Jones, offers equally conclusive evidence of its value. He says: "Whilst the morbid states of the anterior segment of the eye-ball are sufficiently accessible to objective exploration, those of the posterior segment composing the vitreous body, retina, and choroid, could formerly, with some exceptions (*e. g.* exuded matter in the vitreous body, scrofulous and encephaloid growths at the bottom of the eye, &c., which give rise to a yellow shining appearance, sometimes traversed by blood vessels), be determined only from the attendant subjective phenomena. Now it is possible, in most instances, to discover, by means of the ophthalmoscope, opaque spots, shreds, &c. in the vitreous humour, and congestion, with extravasations, exudations, and pigment deposits in or behind the retina."

The late eminent surgeon, Mr. Guthrie, had a very high opinion of the ophthalmoscope, and, as long as he was able to move about, continued to examine his patients with the instru-

ment; when, from illness and loss of strength, he was no longer able to follow up his investigations, he requested me to assist him. His anxiety for the welfare of his patients induced him at all times to give any new mode of investigating or treating their diseases a fair and impartial trial, especially when his great experience and acute judgement told him good might result therefrom.

I now pass on to the investigation of both normal and morbid changes, as seen by the aid of the ophthalmoscope.

THE CORNEA.

THE CORNEA materially contributes both to the comfort and integrity of the organ of vision; yet in its exposed position it is ever liable to suffer from accidents, and also from inflammatory action in various degrees; nevertheless it undergoes no morbid change which cannot be made out, on close inspection, with the unassisted eye, or by the aid of a moderate magnifying glass.

When it has been ascertained by direct exploration that the defect of sight is not occasioned by opacity of the cornea, or change in the delicate membrane which encloses the aqueous fluid, or in the fluid itself, then must we refer our examinations to the deeper-seated structures—and, first, to the crystalline lens.

The Lens, as its name implies, is the most important portion of the dioptrical ocular apparatus. Hence, its importance in health, the great changes which it undergoes in disease, and the skill and knowledge requisite for its treatment and removal, have always rendered it an object of great

interest to the anatomist and surgeon. The lens is partially imbedded in the anterior surface of the vitreous humour, where it is held in place by the elastic suspensory ligament.

The lens is contained in a capsule, and a gradual flattening of the surfaces, with an increasing density of its substance goes on as age advances. Its proper substance consists of fibres arranged side by side, in concentric layers, superimposed upon each other, commencing at the axis and passing from one surface or pole to the other. The general arrangement of the fibres of the lens in different creatures is most easily seen by immersion for a few minutes in water at 180° F. and allowing it to dry in a warm room. In two or three days it will be found split up into sections; the fibres then form good microscopic objects. Dilute acetic acid renders them more transparent for the time, but ultimately they are destroyed by it.

The *capsule of the lens* is a perfectly transparent structure, which is very permeable, and, like most animal membranes, allows exosmose and endosmose very readily to go on, doubtless for the purpose of supplying nourishment to the lens, as it is non-vascular. Any wound, however small, in the capsule during life, invariably leads to opacity and absorption of the lens.

OPACITIES OF THE CRYSTALLINE BODY.—CATARACT.

“ The researches of H. Müller have shown that the capsule of the lens is subject to colloid formations, closely resembling those which affect the elastic lamina of the choroid; and the thickened portions of the capsule occasionally enclose opaque objects; in this way the capsule may have opaque

spots within it; but it deserves notice, that, although within the tissue of the capsule, they are not transformations of it. In most instances, opaque capsules, so called, are really transparent capsules with opaque objects adhering to them; those upon the front of the capsule corresponding to the uveal surface of the iris, and the pupillary area are usually delicate webs of fibrous tissue, with or without uveal pigment entangled in them. When the quantity of uveal pigment is great, these spots are occasionally so dark that the naked eye detects them with difficulty upon the black area of the pupil; the ophthalmoscope at once shows the true nature of these cases. False membranes upon the front of the capsule do not merely in themselves obstruct the rays of light; but they also have an indirect influence on the parts within the capsule; they modify or wholly prevent the nutritious currents through the capsule, and bring about most important changes in the epithelium lining its inner surface and the superficial fibres of the lens. These alterations are attended with a loss of transparency; the appearances are sometimes those of fatty degenerations; but in other instances the intra-capsular epithelium does not simply atrophy; but, by a perversion in its development, it yields an opaque irregular fibrous tissue, instead of the natural fibres of the lens.”*

Different stages of cataract are recognised by surgeons; and the distinction of *true* from *false*—one kind from the

* Mr. Hulke's "Observations on the Crystalline Lens and the Formation of Capsular Opacities." Ophthalmic Hospital Reports. July, 1858.

other—is a point of no small importance ; for on it depends a correct conception of the rise and progress of the disease, and especially the discrimination of the operative procedure best adapted to effect a restoration of sight to the patient. It is well known that the dimness of sight, and opacity in the lens, usually begin in a very unmarked manner, and increase slowly for perhaps months or years, until the cataract is *ripe*—fit for operation.

“ It would appear, however, that even lenticular cataract is sometimes fully developed in a very short space of time. Ritcher relates a case in which cataract was formed in the course of one night. A patient, labouring under gout, accidentally exposed his feet to a great degree of cold during the night, in consequence of which the gout retroceded, and he was deprived of sight. When seen the next morning, a complete pearl-coloured cataract was found. Mr. Wathen was of opinion that blacksmiths, and all mechanics who work near large fires, were more subject to cataracts than other persons ; and he mentions that he had two patients who were instantly seized with cataract at the time they were thus employed.”*

M. Desmarres truly observes : “ There is no opacity of the crystalline body, however small and slight it may be, that cannot be detected by the help of the ophthalmoscope.” Quite recently, in three patients complaining of amblyopia, Desmarres detected incipient cataract, which had on a first examination escaped his practised eye. What stronger argument could I adducè of the value of the ophthalmoscope in recog-

* Dr. Mackenzie, *op. cit.*

nizing this oft-occurring affection. It is indeed quite unnecessary for me to dwell upon the importance of being able to diagnose with absolute certainty the cataractous form of disease. The question of cataract, or other change in the dioptric media, we are expected to decide without hesitation ; and the opinion given will implicate the character of the medical man in the issue of the case. At times, how difficult to determine, not only the existence, but the seat of the cataract—to say whether an opacity which is seen, is one affecting the crystalline capsule, the lens, the vitreous humour, or depends upon a change of the retina, or of the choroid coat.*

A short time since, a mechanic presented himself to me at the hospital, who had been pronounced amaurotic. No visible change could be detected in the dioptric media by daylight. I examined the eye with the ophthalmoscope, and

* Dr. Mackenzie very properly dwells upon the importance of being able to distinguish the early stages of cataract from amaurosis. He observes : “ If a patient with incipient amaurosis presents himself to a practitioner, who mistakes the case, and supposes it to be one of incipient cataract, the advice which he will give will be to wait with patience till the disease be fully developed, then to submit to an operation. Should the patient return after some months with a fully developed amaurosis, instead of a cataract, the practitioner would necessarily feel that he had lost the only season for treating an amaurotic affection with success. The opposite mistake would probably lead him to the employment of depletion, mercury, and counter-irritation, by which his patient’s health might be seriously injured, but which could have no effect in removing an incipient opacity of the lens.”—*Mackenzie’s Diseases of the Eye*, 4th Edition, p. 739.

perceived a grey-coloured central opacity on the posterior capsule of the lens. The vessels of the retina and optic nerve, at first seen with difficulty, were, after a little searching, found in a normal condition. It is not improbable that the opacity began after this patient was pronounced amaurotic ; but, nevertheless, the fact is worth recording, and shows the value of the ophthalmoscope in all cases of doubt.

In the next case the patient was about to undergo a needless operation for the restoration of her sight. Mary F. came to London for the purpose of submitting to the operation for supposed cataracts. Upon examining the eyes with the ophthalmoscope, the lenses were found perfectly free from disease. In the left eye a crescent of pigment surrounded the periphery of the optic nerve, and a very small clot covered the centre, as represented in *Frontispiece, No. 8*. In the right eye, a black spot covered the foramen centrale, and dark grey bodies floated in the vitreous. The vessels and optic nerve were much obscured by the large amount of blood in the eye, and by reflection it imparted an apparent opacity to the lenses ; this had evidently misled when the ordinary mode of examination alone was thought sufficient to decide the state of the case. The patient, a delicate woman, was suckling ; and this I believe was the cause of the deterioration of sight from the first.

A blacksmith, whose imperfection of vision in the right eye had been said to proceed from incipient cataract ; the ophthalmoscope showed the opacity to be one of reflection, from internal congestion ; represented in *Frontispiece, No. 7*. The disease affecting this eye should have been set down to *oph-*

thalmia interna posterior ; the vessels being nearly invisible, from the congestion. This patient was cured by a local abstraction of blood, perfect rest, and brisk purgation, followed by tonics.

Thomas R. æt. 29, Dissenting Minister—Two years ago : “ A speck appeared in each eye, and so annoyed him that he was obliged to consult a medical man ; not feeling satisfied, he was induced to go to a homœopath, who had him under his care for three months ; not the slightest benefit resulted therefrom ; was subsequently blistered and subjected to other treatment ; still his sight became worse, and he was recommended to apply to me.” At this time, September, 1857, his general health was tolerably good, with the exception of occasional headache.

Examined with ophthalmoscope : The right eye has a few small slight bands of lymph adherent in the anterior chamber, partial synechia ; his eye he believes “ to have been much inflamed during first attack, two years ago.” Vessels of retina obscured by a dark red spot, which is surrounded by a greyish ring. The left eye is rather paler, but has also a red web surrounded by a ring, which obscures tortuous and congested vessels. Both pupils are sluggish and dilated. In this case the congestion gave a greyish opaque appearance to the lenses ; and the patient experienced much relief from attention to general health, improved diet, rest to the eyes and over-worked brain, and by the administration of tonics. On the 27th of January, 1858, he thus writes me :—“ I have been compelled to leave London to attend to ministerial duties ; but during the time I was under your treatment my eyes

improved so much that I am quite sure, if I could have remained near you, they would have continued to improve, and perhaps by this time, been quite well; nevertheless, I am able to pursue my avocation, which is a great blessing."

I could narrate numerous other instances; but as my object in bringing forward cases is intended to prove the position I have assumed with regard to the value of the instrument, rather than that of giving every well-attested case, I shall content myself by reiterating, that, in addition to the well-known subjective or physiological indications of the cataractous defect of vision, if the aid of the ophthalmoscope be sought, no doubt can arise as to the true character of the disease, or whether the opacity is *within* or *without* the crystalline capsule, constituting the well-known, true, and false cataract. In short, the whole of the anatomical changes arising from disease will be found to be so many objective or anatomical signs for our guidance on all occasions of doubt or difficulty.

It should be borne in mind, that, if imperfect vision, or even blindness, is produced by a disorganization of the cornea, or the crystalline lens, and if there is the smallest spot in either in a sound state, by placing a small perforated card before the eye, and opposite to that spot, it will give distinct vision of external objects, by shutting out the confused light produced by the disorganized parts of the cornea or crystalline lens, in which the few correctly refracted pencils are lost. The most satisfactory aperture for this experiment, is one made with a darning-needle in a piece of sheet-lead or tin-foil.

Opacities of the lens are mostly of a stellate form, and an

anæmic condition of the vessels is usually associated with the change in the early stage of disease. This fact has induced me to push blood tonics, believing that by improving the blood, and by attention to the general health, I may perhaps arrest the formation of cataract; at all events, the treatment is worth a trial, as in more than one case I have noticed opacities remaining stationary for two years and upwards; during a portion of this time the patients were under medical care.*

* Mr. Jordan believes that cataractous disease is intimately associated with heart disease. "That there should be an intimate connexion between cardiac and ophthalmic disease cannot, *à priori*, be deemed improbable to any one prepared to admit the connexion between diseases of the heart and diseases of the brain. Shall the central artery of the retina maintain its integrity amid the ravages of a disease which does not leave the divisions of the internal carotid itself competent to the performance of their duty? The purely mechanical protrusion of the eye attending a hypertrophic heart is a condition now commonly appreciated. But there are other and more delicate conditions of the visual organ, telling of cardiac states so palpably that they shall challenge the credence of the accomplished physician and the accomplished surgeon." Mr. Jordan, by giving the history of twenty carefully considered cases, shows, more or less, in every instance, heart disease existing in conjunction with non-traumatic cataract. No cause of cataract is known unless heart disease be admitted to act as such; and this latter disease is often associated with ill-feeding and anæmia, or poorness of blood. Admitting that Mr. Jordan is correct, "The questions which now must naturally arise are these: What extent of heart disease shall favour the development of a cataractous opacity? Is there any particular lesion of the heart which more than another predisposes to the affection in question?"

THE VITREOUS BODY.

The vitreous in its normal state is a perfectly homogeneous transparent body, and offers no obstruction to the passage of the light, when thrown into the eye. The most frequent pathological conditions of the vitreous met with, are its fluidity in different degrees, and its obscuration by the so-called *muscæ*. "The changes most difficult of detection are the diffuse or punctated opacities, as they merely throw a veil over the picture of the retina, obscuring the sharp outline of the optic nerve and the vessels of the retina."* By a more careful

These questions meet with some solution in the arguments adduced, and the cases brought forward; in more than half of which, hereditary heart disease was found.

"Probably much light may yet be thrown on the pathology of cataract by future microscopic examination of the opaque lens. In one opportunity I have had of examining a non-traumatic cataractous lens, the microscope revealed fat globules in the nuclei of the delicate cells covering the surface of the crystalline lens, and here and there a few delicate plates of cholesterine might be detected. May not cataract be the result of a process identical with, or analogous to, that of fatty degeneration? That fatty degeneration of a portion of the lens may exist, is proved by the researches of Drs. Ammon and Schön, as quoted by Mackenzie. The former found, in cases of arcus senilis, a fatty arcus on the corresponding margin of the lens. Dr. Schön has found both the lens and posterior capsule affected with fatty degeneration."—*Medico-Chirurgical Review*, April, 1857.

*Gräfe.

investigation, however, this veil will be seen to be composed of a vast number of molecules, situate in the different strata of the vitreous humour, constituting a fine, semi-transparent membrane, or delicate net-work tissue, before the background of the eye: during movements of the eye, this often appears to be separated masses, which float about, and sink downwards when the eye is at rest.

These diffuse semi-transparent opacities disturb vision far more than those of a larger and darker character, which doubtless arises from the intervening parts of the vitreous being more transparent in the latter, than in the former cases. Opacities in the vitreous are often caused by effusion into it, or by exudation of lymph; and Gräfe describes cases in which he has recognised this condition, as well as "*intra-ocular hæmorrhages* occurring periodically during intervals of a few months."

Fluidity of the vitreous body, without myodesopia (floating substances in it), I do not remember to have seen; and the large quantity of muscæ which I have observed floating about in some eyes, induces me to think that a great portion of the pigmentum nigrum must have become detached, escaping into the vitreous. In a case lately examined, the patient being fifty years of age, his eyes, upon casual inspection appearing free from disease, the immense quantity of floating bodies surprised me; nevertheless the man had been pronounced an impostor.

Myodesopia—the vision of floating objects on the surface or in the interior of the eye has attracted considerable attention, chiefly in relation to a symptom, to which the name of

muscæ volitantes has been given. Dr. Mackenzie * divides the disease into *myodesopia sensitiva* and *insensitiva*; the first comprehends those sensations which arise from—1st, a layer of mucus and tears on the surface of the cornea; 2nd, corpuscles between the external surface of the cornea and the focal centre of the eye; 3rd, corpuscles between the focal centre of the eye and the sensitive layer of the retina.

Punkinje and Wheatstone have pointed out methods by which the more minute vessels of the retina, along with the central spot, may be rendered visible to oneself.

Donné has likewise shown that microscopic corpuscles exist both in the aqueous and vitreous humour in large quantities, measuring between $\frac{1}{4000}$ to $\frac{1}{5000}$ of an inch in diameter, and of less specific gravity than the fluid in which they are contained; and when once a person detects such corpuscles, he takes such frequent notice of them that they become more and more troublesome.

The eyes of those troubled with floating *muscæ* present little or no change whereby the existence of such an affection could be detected; by the introduction of the ophthalmoscope all doubt of their true nature has been cleared up, and many important modifications in diagnosis and treatment have resulted therefrom.

A diffused light, and the plane mirror, show changes in the vitreous better than a convex mirror; there is no difficulty in determining the position of exudations, or of corpuscles

* *Diseases of the Eye*, page 950.

between the cornea and focal centre of the eye, or between the focal centre and the sensitive layer. In such changes, we no longer depend on philosophical reasoning for an explanation of the cause, in most cases, of this heretofore obscure disorganization ; the ophthalmoscope now clears up the difficulty, and gives a better explanation than philosophers were wont to give, and whose experiments, in some instances, it appears to me, must have originated bodies having no real existence in some eyes when experimented on. I might instance the experiment of causing a person to search for muscæ “through a pin-hole made in a card, or the eye-glass of a compound microscope”—a fallacious mode of procedure, since we find, by placing a card with a pin-hole in it before the eye, external objects, as particles of very fine dust, constantly floating about in the atmosphere, are, in this way, much magnified, and at the same time so ill-defined as to puzzle most patients ; and whether the objects seen, are floating outside or inside the eye, they cannot positively say. “ Nothing serves so much to increase the perception of muscæ volitantes as often searching for them through pin-holes, lenses, &c. Such experiments seem to rouse them into existence ; and he who has thus brought himself to discover them, continues to see them, and cannot get quit of them.”*

In some patients, who complain of spots, flakes, or shreds before their eyes, I have been unable to detect exudations into the vitreous, but have found a congested state of the vessels, sufficiently great to account for these supposed shreds

* Dr. Mackenzie.

or spots before their vision. In Hydrophthalmia posterior, when the accumulation of fluid is between the choroid and retina, causing the latter to bulge forward; by means of the ophthalmoscope this altered membrane is distinctly seen in the vitreous, the opaque and crumbled retina being no doubt often mistaken for a cataract or a fungoid growth.

In uncomplicated cases, *muscæ volitantes* may increase in numbers, though slowly, but never to such an extent as to interfere with the distinctness of vision in any serious degree; frequently they remain stationary, or even become less.

The removal or abatement of the exciting cause, is the first thing to be attended to in the treatment of simple cases. Rest to the eyes, if they have been overstrained, relaxation from business, quiet to the mind, regulated diet, exercise, change of air, &c. are to be recommended.

Floating *muscæ* should be distinguished from fixed *muscæ*, which have no real motion, but apparent motion entirely depending on that of the eye-ball.

“It can scarcely be doubted, that both the small black points, which in certain cases are deposited on the concave surface of the retina, constituting what is termed *melanosis retinæ*, and the larger red bodies, which in other cases are met with on its convex surface, and are called *neuromata*, often give rise to fixed *muscæ*.

“Langenbeck relates a case of a man, long troubled with *muscæ*. On dissection, neither the aqueous humour, carefully preserved, and examined with the microscope, nor the lens, nor the vitreous humour, showed anything unnatural. The

retina and the coats of the eye, to the naked eye seemed normal. The vessels of the retina were not enlarged, and were neither more numerous nor fuller of blood than usual. On examining the retina microscopically, the whole internal surface was seen to be covered with blackish or brown points, formed apparently of molecules of pigmentum nigrum, accumulated into little globules about ten times larger than the medullary globules of the retina. They were dispersed equally, and in a certain sort of order, over the retina, following chiefly the course of the blood vessels. They were detected in each retina, but were blacker and more numerous in the left.

“The patient was never altogether free from myodesopia, although at certain times, especially after drinking spirits, the disease increased. Certain of the spectra which he saw, floated before his eyes; others, and these more numerous, remained fixed. In writing, he complained that the paper seemed sprinkled over with snuff, and so similar were the spectra which he saw to grains of snuff, that he often tried to brush them away.

“The little tumours, called *neuromata*, in all probability arise from chronic retinitis; they chiefly cover the convex surface of the retina, being of a red colour, pellucid, and somewhat prominent; some of them are visible to the naked eye upon dissection, being twice as large as poppy seeds; others so small as not to be seen without the microscope. They are mixed with black points, and surrounded by striæ of pigmentum nigrum. Some of them are depressed in the middle into a sort of umbilicus, and have a black point within. They

are imbedded in the substance of the retina, and may perhaps be morbid enlargements of the medullary globules of the retina." Such is the account given by Langenbeck, and quoted by Mackenzie.

Floating bodies, *muscæ*, are not unfrequently the cause of very troublesome spectral illusions. A young lady suffering from *muscæ* often imagines she sees persons or animals moving about her room, which is particularly troublesome towards evening, or in a dull light, when the pupil becomes dilated. This condition will explain many curious illusions of which we hear, and find associated with particular temperaments; hysteria, hypochondriasis, febrile and other affections; curable by judicious medical treatment.

"An optical spectrum is seen when the eye has been strained by looking on any particular object or colour. The ray of white light consists of the three prismatic or primitive colours. Now, if the eye is fatigued by one of these colours, or it be lost, mechanically or physiologically, the impression of two only will remain, and this accidental or complementary colour is composed of the two remaining constituents of the white ray. Thus, if the eye has been strained on a *red* colour, it is insensible to this, but perceives the *blue* and the *yellow*, the combination of which is *green*. So, if we look long on a *green* spot, and then fix the eye on *white* paper, the spectrum will be of a light *red*. A *violet* spot will become *yellow*; a *blue* spot *orange-red*; a black spot will entirely disappear on a *white* ground, for it has no complementary colour; but it appears *white* on a *dark* ground, as a white spot will change to black. The colours of objects are also

.

changed in some cases of ophthalmia ; the eye, from certain diseases of the nerve, may only see half its object ; the same things may appear and disappear alternately ; objects at rest may appear in motion, and the spectral images of persons and things formerly seen, may be exactly reproduced. Even more than this may occur physically, for material objects may seem what they are not, and especially under certain predisposing causes of a mental nature.

“Optical illusions at times present themselves in very curious and mystic aspects, which is, doubtless, owing as much to some temporary derangement of the organ of vision, or to that of bodily ill health, as to external refraction.”*

MYODESOPIA.

“Eliza M. aged 36, a pale, feeble-looking woman, applied at the Ophthalmic Hospital, complaining that for months back her sight had been failing. She carried in her arms a stout baby ten months old, and stated, on enquiry, that it was her ninth, and lived almost solely upon the breast. She had suffered no pain whatever in her eyes, and there was not the slightest congestion of any part to be seen. The pupils were of moderate size, and freely mobile ; indeed, as far as the unassisted eye could discover, the eyes were perfectly normal. Her account was, that for four months the sight had been dim, as if smoke were before her eyes ;

* Dendy's *Philosophy of Mystery*.

muscæ volitantes had also been troublesome. At no time had there been either pain or redness. She could still see large print, but not sufficiently well to read it, and she could not tell the time by a large clock at the opposite side of the room. With such a history and such symptoms, could any one have been blamed for pronouncing the origin of the disease to be asthenia lactanæum, and ordering the woman to wean her baby, and take stout and quinine? Five years ago, we question whether one surgeon in a thousand would have arrived at any other conclusion. It was deemed best, however, to employ the ophthalmoscope before prescribing; and with the light which that instrument threw upon it, the case assumed a totally different aspect. In each eye the vitreous humour was seen to be hazy, and to have numerous white flakes and films floating about in it. This condition having been previously often noticed in conjunction with secondary syphilis, the woman was at once questioned, and as quickly admitted that she had contracted sores, and that at the present time she had a rash on her chest and shoulders. This rash proved to be syphilitic psoriasis. Here then was a case in which the stress of the syphilitic inflammation had fallen upon the vitreous, and the iris had wholly escaped. The obscurity of the vitreous prevented the state of the choroid from being accurately ascertained. The patient was ordered to wean her baby, and a course of mild mercurials was prescribed.”*

* *Medical Times and Gazette*, July 17, 1858.

HEMIOPIA, WITH MUSCÆ FIXED AND FLOATING.

Hemioopia, half vision, is a peculiar variety of blindness, which is frequently associated with myodesopsia.

Dr. Wollaston, a few years before his death, was the means of directing considerable attention to this disease, by his paper "*On Semidecussation of the Optic Nerves*," published in the Philosophical Transactions. He had been twice attacked by hemioopia, and had occasionally met with it in others. "One of my friends," he says, "has been habitually subject to it for sixteen or seventeen years, whenever his stomach is in any considerable degree deranged. In him the blindness has been invariably to his right of the centre of vision, and, from want of due consideration, had been considered a temporary insensibility of the right eye; but he is now satisfied that this is not really the case, but that both eyes have been similarly affected with half-blindness. This symptom of his indigestion usually lasts about twenty minutes, and then subsides, without leaving any permanent imperfection of sight."

The disease may, however, assume a more serious aspect, as when combined with muscæ, &c.

W. R. aged 30, Engineer: Six years since, the vision in right eye was much impaired, and lately the left eye has become affected and sight is gradually falling off. Works a great deal by gas-light; looks a strong, hearty man, is married, and of very sober habits. Both eyes becoming affected, was advised to apply to a general hospital, but derived no benefit whatever from the treatment. Is troubled very

much with small bright stars floating in both eyes, has partial mydriasis, with side vision in left eye ; first and second molar teeth, in left upper jaw, much decayed and often troublesome, with headache.

Examined with ophthalmoscope : Lenses clear, optic nerves cupped or concave in form ; vessels of retinae partially obscured, small, and irregular in both eyes, the left eye appearing rather the worst. During motion of the eyes, pigmental masses float about, other patches of a lighter colour remain fixed, with intervals or spaces deficient in choroid. To the lower and nasal side of the left eye, a large black patch, partially covering the optic nerve. The following medicines were prescribed.

Alterative doses of mercury with chalk every night, and followed by a mixture of rhubarb and infusion of quassia twice a-day.

January 19th.—Teeth very troublesome, recommended him to have two much decayed removed.

February 18th.—Improving, still annoyed by tooth-ache, extraction of another tooth, third upper molar decayed.

March 1st.—Much improved, medicine not very regularly taken, but able to resume his work.

HEMIOPIA.

“ A porter, aged 40 years, suffered from hemiopia of the right eye, which for about a year remained stationary, when a gradual diminution of sight came on. The patient saw objects only from the inner and upper portion of the retina, and then but faintly. The eye appeared normal, with

the exception of a slight divergence from the optic axis. Pupils sluggish. The ophthalmoscope showed a separation in the retina towards the lower and outer portion, stretching somewhat over to the inner side. It had the appearance of a greyish white folded membrane ; and, with every motion of the eye, it waved too and fro. The veins appeared very dark and thick, taking a serpentine course towards and over the retina. The arteries were apparently split up into numerous fine branches, deeply colouring the retina, and the optic nerve had a bluish centre."

HEMIOPIA, WITH FLOATING BODIES IN THE VITREOUS.

"Mme. Gondalier, a needle-woman, aged 26, had enjoyed excellent health till the month of February, 1853, when, after working during a great part of the night, she rose in the morning with considerable dimness in her eye-sight. This state grew worse from day to day, and, since the month of October, the left eye, which is the one most affected, can hardly see large objects ; and of these she only distinguishes the lower part, the upper part escapes her.

"The sub-conjunctival tissue is injected, the pupil dilated, but perfectly translucent ; the iris retains its natural aspect ; the patient has never experienced myopia.

"*Examined with ophthalmoscope:* The vitreous humour is full of brown flakes, floating during every movement of the eye. At the inferior part of the ocular cavity is seen a greenish mass, in appearance rather solid. It is free, and always sinks down to the bottom of the eye. In all probability this is an old hæmorrhagic exudation into the vitreous. The retina is

not altered ; the (half-vision) hemiopia, of which the patient complains, seems to be owing to the obstacle which the opaque masses oppose to the rays of light as they pass to the retina.

“I have very often met with these corpuscular bodies in a smaller or larger number, with or without any alteration whatever in the retina ; and even, in several cases, when nothing had previously given cause to presume the existence of dissolution of the vitreous body. What is the nature of these corpuscles ? Are they portions of pigment, or hæmorrhagic exudation into the vitreous ? The latter seems at least to be the most probable, seeing the frequent internal hæmorrhages the body suffers from ; but pathological anatomy must be left to decide this question.”*

When blindness follows injury, I have often detected, with the ophthalmoscope, clots of blood in the vitreous body ; and, in my examination of an affected eye after death, I found several places exposed in the choroid, a partial detachment of the pigment layer, with small greyish particles in the vitreous ; but I have been unable to satisfy myself of the true nature of these small bodies, whether particles of blood or pigment I am not sure, decomposition having commenced in this case.

Desmarres writes : “The effusion of blood into the vitreous humour, which I have observed with the ophthalmoscope, have appeared to proceed from the rupture either of a retinal, or of several choroidal vessels. I have seen the

* Dr. Anagnostakis.—“*Essai sur l'exploration de la Rétine.*”

disease in connexion with the hæmorrhagic diathesis, in a man thirty-one years of age. In this disease the principal objective symptom is a collection of blood in the lower part of the eye, immediately behind the lens, with which it appears to be in contact. In many cases, if the light be thrown behind the iris and downwards, the clot is seen of a fine red colour, even though we look past the side of the ophthalmoscope, instead of through the aperture.

“When the effusion is recent, the vitreous humour is turbid, but rarely quite obscure; ultimately the blood disappears, leaving flocculi in the vitreous humour in greater or less abundance. The turbidity clears up gradually, and in from two to six weeks we begin to see the optic disc as through a fog; and as this disappears we may perhaps ascertain whether the hæmorrhage has been from the retina or the choroid. In the first case, we see in the course of one of the retinal vessels a small dark red spot, with a central point, almost black, indicating the precise source of the hæmorrhage. In the second case there is a large spot of ecchymosis under the retina, which membrane is lacerated; but we cannot trace the source of the blood to the rupture of an individual vessel. Retinal hæmorrhage is generally limited in extent; it may be profuse when it proceeds from the choroid.

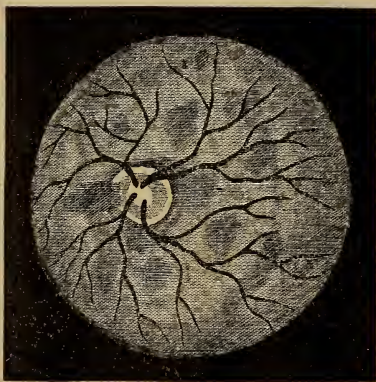
“Effusion of blood into the vitreous humour is not accompanied by redness of the eyeball; the eye maintains externally a perfectly normal appearance.

The physiological symptoms are sudden loss of sight, with the appearance before the eye of variously coloured flashes of light or sparks of fire. If the accident occur during

sleep, the patient discovers his loss of sight in the morning without having felt anything. Some patients can still discern large objects; but I have never met with any one who could read even the largest type.

“In very copious hæmorrhages, the prognosis is unfavourable, and relapses frequently occur; in slight cases, the eye recovers readily, but often remains weak for several months.”

FIG. 2.



Nyctalopia, with muscæ floating and fixed.

(NYCTALOPIA)—DAY BLINDNESS—WITH MUSCÆ.

T. J. aged 46, a sailor in the Queen's service, was sent home from Constantinople. He stated that his health had been always good, except on one occasion when he suffered from syphilitic disease seventeen years ago. In the month of

March, while in the Crimea, after having lived entirely on salt provisions without vegetables, and at the same time exposed to the cold winds and hail, during three weeks' work in snow, he was attacked with a bleeding at the nose which lasted five hours, which ceased when he was made warm and comfortable. Four days after this, his eyes were much inflamed and ran with water; this attack lasted about three weeks, during which time he found he could only see about night-fall; he was unable to find his way about, and was sent to hospital, where he was cupped, blistered, and bled from the arm until he felt much weakened, his sight not being in the least improved; he was then sent to the hospital at Constantinople, and a tonic plan of treatment prescribed. After a short lapse of time, he was able to work a little by night, but not at all in the day time. He tried several kinds of spectacles without benefit.

Examined with ophthalmoscope: Lenses perfectly clear, vessels of retina large, numerous, and distinctly seen; over papilla optica a bluish patch, and a general greyish appearance of the optic nerve; the fundus has a curiously mottled appearance, rather dark in colour like pigmental masses seen through a red gauze. One spot larger and darker, fixed near the inner side of optic nerve (*Fig. 2*). Many floating specks of a dark grey colour.

External vessels of conjunctivæ larger and more numerous than in normal state. Continuously looking on the snow, he was told, brought on the first attack of inflammation. Prochaska speaks of a man who was attacked in a similar way, and during the inflammation could see by night, but lost that

power as the inflammation subsided. Many similar cases are on record. My patient was pale and weak, and I considered the administration of tonics would give him the best chance of recovery.

Mist : Ferri : Co : was prescribed three times a-day ; this he continued to take with advantage, up to the 16th Feb. 1857 ; he then said he could just make out persons passing before him by daylight, and had great hopes of regaining sufficient sight to go about alone.

The Admiralty about this time decided upon sending him home to Hanover. The further progress of the case was consequently lost ; nevertheless the recovery was satisfactorily progressing when he left the hospital.

FLOATING BODIES IN VITREOUS.

“ M. D. aged 41, of a sanguineous constitution, was suddenly affected, twelve years ago, with paralysis of the internal rectus muscle of the left eye. In that state he presented himself, in the month of October, 1853, to M. Desmarres, the left eye having somewhat recovered its movements. The globe is harder to the touch than that of the opposite side, iris preserves its normal colour, and the pupil is free from adhesions, although slightly tremulous. Two small spots appear at the inferior periphery of the lens.

“ *Examined with ophthalmoscope* : The crystalline opacity appears to be of a brown colour, on a reddish ground. In the vitreous humour can be seen a mass of dark brown bodies of divers forms, varying in size from a grain of sand to a thick pin's head ; others are long and angular. At each movement

of the eye, these bodies float about in every direction; one might liken them to small grains in some boiling liquid. The retina is normal."

AMBLYOPIA, WITH FLOATING BODIES IN VITREOUS.

"Towards the end of November, 1853, Filliond, a cook, aged 29, presented himself; of a weak constitution, pale complexion, complaining of imperfect vision in the right eye.

"On examination, the eye appeared normal; no injection in the conjunctiva, nor in the sub-conjunctival tissue. The coloration of the iris natural; the pupil free, transparent, and dilated. Six months ago, this man received a contusion by running against a wall. It was only four months afterwards, when, by chance, in closing his left eye, he perceived that he was nearly deprived of sight in the right, and from that time he saw a cobweb before his eye.

"*Examined with ophthalmoscope*: In the posterior segment of the vitreous there are three large brown flaky bodies, connected together by several fine filaments, forming a sort of lace, spread athwart in the ocular cavity, and situated rather close to the retina, intercepting the luminous rays and preventing the formation of images. During movements of the eye, the mass moves from below upwards, and again sinks to the bottom of the organ. What is most striking in these movements is that they are confined mostly to the fundus of the eye; the disease no doubt affects only the posterior segment of the vitreous body."*

* Anagnostakis, op. cit.

Dr. Ruete gives the following case of a lady, who suffered six months with slight defect of vision, which subsequently increased so much that all objects appeared as dark irregular bodies. The left eye she could for some time use ; but this at length became as much affected as the right, when she required to be led about.

Examination in the usual way showed nothing abnormal ; but with the ophthalmoscope, the right eye appeared as represented in *Frontispiece, Fig. 2*. The vitreous was apparently quite clear ; but, upon attentively watching, a crescentic-shaped body moved over the field of view, without approaching either the lens or retina. She became totally blind, and this singular body, most probably an Entozoon—*Cysticercus*—still floated in the vitreous.

The detection of *Cysticercus* in the deeper parts of the eye, in the living human subject, has only been possible since the introduction of the ophthalmoscope into surgical practice. It is necessary, however, to be careful in these inquiries, and to know how to avoid illusions. Dr. A. Von Gräfe was the first to recognise this parasite in the vitreous humour of the living human subject. “A membranous cylinder of about one millimeter, with transparent walls, is observed before the retina, near a dingy brownish optic nerve ; it is directed forwards, so that it runs through the vitreous body nearly in the direction of the axis of vision. In this cylinder the *Cysticercus* lies. The posterior end of this cylinder reaches to the retina, but the fundus of the vesicle of the *Cysticercus* separates distinctly a little before it. Anteriorly the longish vesicle diminishes in calibre, and runs,

somewhat constricted in the middle, into the neck region in front. The head itself is situated in the centre of the mass, and appears as a whitish swelling, the true relations of which are concealed by the enveloping membrane, and from which various streaky pseudo-membranous bands run forwards and towards the lens." Still, in front of the body just described, and on the posterior wall of the lens, lies a second body, similar to a *Cysticercus*; as to this, Von Gräfe was not perfectly clear at the time, but which might possibly be a dead *Cysticercus*. Even in the first case, movements could not be distinctly perceived; a circumstance which must be explained by the position of the structure exactly in the axis of vision, and by the fact that the sac referred to is itself in a constant state of rocking motion, and consequently it is very difficult to get a clear view of the independent movements of the worm. Nevertheless, Gräfe believed he recognised the undulatory contraction of the caudal vesicle of the worm.

During the continuance of the malady just mentioned, the patient, who was afflicted with strabismus, and on that account sought Gräfe's advice, could still distinguish fingers at a distance of several feet; but during fixation, the axis of vision was diverted considerably inwards from the object. The patient could not decipher the largest print, even with magnifying glasses. The other eye was sound. *Tænia solium* was present; but there were no *Cysticerci* in other parts of the body.

In No. 45 of the 'Deutsche Klinik' for 1856 ('Sitzungsbericht der Ges. für wiss. Med.' July 21st and August 11th, 1856), Gräfe reported upon a moveable *Cysticercus cellulosæ*

in the vitreous humour, which already began to exhibit turbidity, in consequence of the irritation to which the animal gave rise in it. Gräfe made an opening in the sclerotic coat, and afterwards extracted the *Cysticercus*, with great difficulty, through this opening. In this operation, the caudal part of the vesicle was torn off, and the head and neck, which were seized by a pair of forceps, could only be got out after several attempts. Of the cyst, only a portion was removed. The suckers of the *Cysticercus* continued to move for twenty minutes under the microscope. The visual power of the patient improved; he could read large print, count fingers, go out, &c.; but at the time when Gräfe made his report, chronic choroiditis was apprehended.

Cysticercus in the retina.—In one case, the patient observed, three weeks before his visiting Gräfe's hospital, a cloud in front of the left eye, in the middle of the field of vision, and diffusing itself thence towards the sides, so that the patient only had a perfect sensation of light from the sides, whilst in the middle of the axis of vision only large and strongly illuminated objects glimmered as if through a thick cloud. In course of time, however, the sensibility to light was entirely extinguished in this eye. The lens and vitreous humour were clear; but in the middle of the retina, a shining greenish body was seen, which was bordered by convex circular margins, and lay a little outwards from the centre of the retina, on the outside of the optic nerve. The rest of the retina was healthy. Examined in the reversed image, the body appeared as a perfect, roundish, greenish vesicle, four times larger in diameter than the entrance of the

optic nerve. It was firmly attached to the retina, and projected, with its anterior wall, into the vitreous body, in which was perceived a white, button-like, projecting appendage, distinctly marked by its greater opacity and its colour, which shifted its place, although no separate parts could be perceived, and over which a pair of vessels ran forwards.

On this account, Gräfe supposed that the worm had a fine enveloping membrane. When the axis of vision was completely fixed, the walls of the vesicle exhibited flattenings, or cup-like depressions, in several places simultaneously, together with movements which diffused themselves in an undulatory manner. In three weeks the vesicle had increased about one third in diameter, and reached to the optic nerve. The head had passed from the centre to beneath the upper margin, and appeared to have grown like a small vesicle out of the previous one; that is to say, the enveloping cyst had probably burst, and a small vesicle protruded which reached to the former. On the head, distinct swellings, and a neck which sometimes extended and sometimes retracted, were now seen. Ten weeks after the first observation, the vesicle was not remarkably enlarged, but less greenish and more transparent. The above-mentioned vessels appeared to be obliterated bands. The small appendage was nearly as large as the original vesicle, and covered the optic nerve entirely. The rest of the retina had lost its colour, and was covered with irregular, blended, pale spots, of which Gräfe did not know whether they lay in or behind the retina. In five months, the first vesicle was completely collapsed; and, instead of it, a folded transparent membrane, without determinate outlines, was to

be seen moving up and down, and the second vesicle also was less distinctly detected with indeterminate outlines. The animal, however, was still alive, and its head lay towards the nasal side. Cystic worms appeared in no other part of the body, nor did the patient suffer from tape-worm.

In a second case, in which no *Cysticerci* appeared in other parts of the body, but in which segments of *Tæniæ* were passed, glimmerings, cloudy vision, and complete dimness of sight appear to have established themselves gradually in the right eye, in which inflammation had from time to time been set up, accompanied by violent attacks of head-ache on the right side, until at last only a slight appearance of light remained. With the ophthalmoscope, a round, vesicular body, and the before-mentioned undulatory movements, were seen above the place of entrance of the optic nerve. Its fine bluish-green colour was deadened by a slight veil (enveloping membrane). As if inverted in the vesicle, a white head was seen, which alternately extended and retracted a neck. In this case also, the above-mentioned greenish spots were seen upon the retina. In course of time, the shining colour gradually disappeared; but there was no change in the form and size of the entozoon. In nine months, instead of the vesicle, only a colourless membrane, or a system of such membranes, which covered the greater part of the tender surface of the eye, was seen floating in the vitreous humour. The sensibility to light had entirely been lost. Although, as already remarked, there was no external appearance of *Cysticerci*, Gräfe thinks that the previous weakness of one arm, the violent head-aches, the glimmering, and the subjective ap-

pearance of light in the other eye, must be referred to a simultaneous existence of *Cysticerci* in the brain.

In a third case, Gräfe saw the vesicle shining immoveably to the right, in the outer part of the back of the eye, through a septum of translucent membranes, which penetrated the back part of the vitreous body; he saw the movements of the vesicle and the neck distinctly, but the sucking discs indistinctly. This eye was quite blind; the other was healthy. There was no trace of tape-worm, or of *Cysticercus*, in other parts of the body.

When the *Cysticercus* is situated in the anterior chamber of the eye, in which situation it was first seen by Sömmering, and the symptoms were the frequent recurrence of ophthalmia, sub-conjunctival injection, coating of the posterior laminae of the cornea, chronic but particularly local iritis, which was exacerbated periodically by the constant accompaniment of rather violent symptomatic ciliary neurosis, and which made its appearance at the very commencement of the affection—by this, the visual power was of course so seriously dimmed, that total blindness must be in most cases the inevitable result, if left to itself—there can, then, be no doubt about the propriety of operative interference. The diagnosis can only be furnished, as we have seen in Gräfe's cases, by the recognition of the worms, which assume various forms. Sometimes the vesicle lies quiet at the bottom of the eye; at other times it rises up, and thus covers the pupil entirely; which will be best recognised by allowing a strong light to pass through the pupil after it has been dilated by atropine.

GLAUCOMA.

Glaucoma: It is of very great importance in ophthalmic surgery to be able to discriminate this form of disease from that of other internal affections; and I have no hesitation in stating that, with the ophthalmoscope, this can be done with a certainty heretofore unattainable. With this instrument, we can positively say to what extent the dioptric media of the eye are involved; this is important, since a remarkable opalescent appearance, which generally accompanies glaucoma, more frequently causes it to be confounded with cataract than with any other change, although, in the commencement of glaucoma, the opacity appears deeper-seated than the lens. The apparent colour in the vitreous humour ultimately approaches to the posterior capsule of the lens, and then to the structure of the lens itself, which thereby becomes, as Mackenzie stated, *diplo-chromatic*: and, "the peculiar sea-green opacity appears to change its seat according to the direction in which the light is admitted to the eye, being always seen most distinctly on the side opposite the light. When the disease is advanced, the inverted image in the catoptrical test is indistinct or obliterated."

Glaucoma, with its peculiar characteristic greenish colour, is still involved in much obscurity, giving rise to great diversity of opinion regarding its true seat. Professor Rosas, in his latest work on diseases of the eye, distinguishes three kinds of glaucoma; viz. one of the hyaloid, another of the retina, and a third of the choroid. He makes no mention of the change in the lens observed by Dr. Mackenzie. There is

another form which he denominates *acute glaucoma* ; in this, the patient suddenly becomes blind. Choroiditis, and the eye presenting at the same time the characteristic green reflection behind the pupil, contradistinguishes it. The usual form is attended frequently with no signs of inflammation, is slow in its progress, especially in the appearances presented by the dioptric media of the eye, which, as before stated, cause it to be confounded with cataract. Glaucoma is divided by Mackenzie into *six stages*. In the first and second stages, he believes glaucoma to be generally a disease of the crystalline alone ; sometimes accompanied by amaurosis from the commencement ; for he says : “ the disease may set in with iridescent vision, followed by insensibility of the retina, and, after a time, by *diplochromatism* of the lens. In its advanced stage, glaucoma presents symptoms depending on certain morbid conditions of almost every texture of the eye.”

The situation of the opacity has given rise to considerable discussion, more so in the commencement of the disease, than after it has continued some time. Indeed, in the early stage, the greenish colour, often sea-green, is seen as if occupying the vitreous humour, and at last appears to be immediately behind, or in the posterior part of the lens. Dr. Mackenzie's dissections tend to confirm this opinion, although he says—“ that, upon taking out the eye, all greenness is gone, both in the eye deprived of its crystalline, and in the lens under examination. On being viewed against the light, the lens is found of a deep amber colour. The lens and the vitreous humour, which is also often yellowish in glaucoma, have the power of analysing the incident light,

absorbing the violet, blue, and red rays, leaving the yellow and green rays but little affected, so that they are dispersed; whence results the apparently green appearance of the humours." This he considers is borne out by the well-known fact, that various natural as well as artificial substances present different colours, accordingly as they are seen by reflected or refracted light.

Before quitting the subject of glaucomatous affections, and the peculiar brightness of the back of the eye in the disease, I may mention that Beer seemed to have included, under the name of *cat's-eye*, the silvery reflection in the eyes of old people, and also that appearance which is observed occasionally in children, resulting from scrofulous and non-malignant depositions at the back of the eye. The late Mr. Tyrrell believed this affection existed in the choroid, or between it and the retina: without the ophthalmoscope, the reflection can only be seen by daylight, and when the observer stands near the light and a little on one side, with the patient placed some distance from him. Mr. Cumming, upon attentively observing this reflection, came to the conclusion that it proceeded from the choroid with its pigment—as the principal reflecting structure of the eye—and became increased in effect by the light returned from the retina and the concavity of the hyaloid body; and with regard to Beer's assumptions, he had no doubt that Beer was speaking of the reflection in a healthy eye at one time, and at another of a case in which lymph had been deposited on the retina, causing the bright metallic appearance. Doubtless, his conclusions are correct; and this will be readily seen, if we examine into the

blood supplies of the principal structures of the interior of the eyeball, and how much, in all probability, this must affect the reflecting media of the eye. In the choroid and iris, almost the whole of the red blood of the eye is concentrated; there is a small quantity in the sclerotica, a still smaller quantity in the retina, and none in the crystalline, vitreous, or cornea. The transparency of the refractive parts of the eye forbids that they should be traversed by red vessels; and were such vessels large and numerous in the retina, its sensibility would in all probability be interfered with.

ASTHENOPY FROM CONGESTION: GLAUCOMA?

E. R. aged 22, a carpenter, came to me in January last; about eighteen months before, his sight grew very dim, he could scarcely see to work; was then weak from a neglected gonorrhœa, although he continued to work hard; an eruption appeared over the body, and with it greatly impaired vision. At present, a bright star of light continually floats before him; he can only read the largest letters on the side of an omnibus; general health not very good; no headache or pain in the orbit; the eyes full and tense to the touch, presenting the peculiar greenish opacity.

Examined with ophthalmoscope: Pupil dilated, dioptric media perfectly transparent; in right eye a small black spot covers the foramen centrale, the vessels of retina are large and congested; left eye, a fixed spot, but not so large nor so well marked as in right; the congestion doubtless imparting the peculiar opacity. The patient was ordered to take a grey powder every night, and rhubarb mixture twice a day.

18th February—Much better; but, as the eruption of the skin remained troublesome, a mixture containing small doses of the binionide of mercury, in decoction of bark, was prescribed in the place of the former. His improvement progressed most steadily, and the opacity at no distant date was entirely removed.

ASTHENOPY FROM EFFUSION: GLAUCOMA?

W. H. aged 35, engineer.—Sight became gradually dim, the left eye first annoying him, saw dark spots in it; twelve months afterwards, the right eye was similarly affected. “About twelve months ago, was leading an irregular life, and contracted a gonorrhœa; his eyes were then affected with an inflammation, since which time the sight has been much worse.” If he made any attempt to read, one letter ran into the other; obliged to give up his work from the same cause. The eye is full and hard to the touch, and presents the characteristic greenish opacity.

Examined with ophthalmoscope: Lenses perfectly clear; fundus of right eye presents a deep red appearance; vessels very numerous and irregular; peripheral margin of optic nerve irregular, and studded with dark spots. Left eye, optic nerve oval in shape, a yellowish grey-coloured film covers the irregular vessels; choroid of a dull reddish colour, with grey patches distributed about. Bichloride of mercury with iodide of potash in decoction of bark was prescribed; from this he derived considerable benefit, and was enabled to resume work in two months from the date of his admission.

ASTHENOPY OF LEFT EYE: GLAUCOMA?

W. S. aged 16, a spare looking lad, came to me February 18th, 1857, complaining of imperfect vision in left eye, obliged to give up school; when reading only for a few minutes, one line running into another, especially if anxious to read; head "feels as if something floated about in it;" pain and occasional loss of power over the left arm and side, with loss of appetite; the only apparent change in the eyes was a slightly dilated state of the pupils, with considerable tension, and the peculiar greenish opacity.

Examined with ophthalmoscope: Vessels of retina large, congested, and irregular, veins particularly so. A few vessels running horizontally from the papilla over the foramen centrale. Optic nerve large, with a pigmental deposit near superior and inner periphery; fundus of the eye of a brick-dust red colour. The retina appears of a bluish grey colour, and is pushed out apparently by effusion between it and the choroid. *Lenses quite clear.* The pain in head, with other symptoms of cerebral irritation, induced me to prescribe small doses of mercury, chalk, and rhubarb, night and morning.

On the 25th the boy was much better, at the end of March had improved so much that he could read steadily for some time without fatigue.

Dr. Anagnostakis relates of one: "Beillaud, a book-keeper, aged 42, of a sanguineous habit, who, during recovery from an attack of dysentery, experienced, without any known cause, a remarkable weakness of sight; at the end of a month the left eye could scarcely distinguish day from night. With

the exception of the greenish opacity, a slight dilatation of the pupil, and some injection of the conjunctival vessels, there were no other symptoms to account for the blindness. The ophthalmoscope revealed congestion of the vessels of the retina, with many small hæmorrhagic patches of different shades of colour distributed over the retina."

In several cases of congestive amblyopia, which came under the care of Dr. Anagnostakis, as well as in a few advanced cases, in which the eyes presented the characteristic glaucomatous colour, he observed blood effused beneath the retina; in other cases, hyperæmia of the retina was the only alteration he could positively make out, and in no instance was there any change in the crystalline body; thus far his observations agree with my own, and I am quite of opinion that in every case medical treatment should be resorted to, and persevered in, prior to any operative procedure.

Notwithstanding what I have said about the difficulty of diagnosing this disease, two conditions can be positively recognized—the acute and chronic.

Professor Gräfe has shown that there is a gradually increasing pressure within the eye, contingent upon an increased afflux of blood into the vessels of the interior, and that with this there are secondary changes.* There is an enlargement

* The intra-ocular pressure, giving rise to hardness of the eye-ball and increased insensibility of retina, is a fact long ago pointed out by Mackenzie. The cup-like depression of the optic papilla is probably an effect of the atrophied state of the optic nerve, also described by him.

of the veins on the surface of the eye, in the same way as the veins of the abdomen are enlarged when the circulation through the liver is impeded. There is also an excavated state of the entrance of the optic nerve. Another remarkable condition is the pulsation of the artery of the retina. Naturally that artery has no visible pulsation; but if the eye is pressed, even in a healthy person, for a certain time, the pulsation may be rendered visible, the circulation being so impeded that the afflux of blood is shown at every jet. When this condition does not exist in glaucoma, the slightest pressure will produce it; and Gräfe regarded it as a pathognomonic sign of the disease. All these conditions characterized the disease in an unmistakable manner, and point to the mode of treatment which Gräfe has recommended. Gräfe has shown also that the loss of vision in the condition of early glaucoma is not the result of any change primarily occurring in the retina, but of a pressure of the vessels, and that if such pressure is removed, the retina regains its power.

“The symptoms of acute glaucoma have been often and well described; but the ophthalmoscopic signs are less widely known. They are, a dilated state of the retinal veins, often tortuous and turgid with blood; small ecchymoses scattered over the surface of the retina; occasionally small blood-clots in the vitreous humour; pulsation in the arteria centralis retinæ; and an excavated state of the optic papilla. Although in acute glaucoma the urgent symptoms often set in very suddenly, yet in a large number of cases the outbreak has been foreshadowed by a train of premonitory symptoms. These are, occasional dimness of sight, often towards evening,

shooting pains in the eyeball, *muscæ*, and a gradual diminution of the field of vision. Gräfe has drawn particular attention to this last point. The outbreak may be followed by a remission; only a temporary improvement, for fresh paroxysms will occur, and blindness inevitably result. In the advanced stages, sclerotic staphylomata are apt to occur, mostly behind the insertions of the recti tendons. Chronic glaucoma differs from the acute chiefly by the insidiousness of its course, which is unmarked by those violent symptoms which characterize the outbreak of the acute form. It is quite as intractable as the acute form. The retinal veins are turgid, and the retina is sprinkled with hæmorrhagic spots, just as in the acute form. Sometimes in the same person one eye is attacked by acute, the other by chronic glaucoma. These facts favour the supposition that acute and chronic glaucoma are only different forms of the same disease. Gräfe has called attention to a peculiar form of amaurosis, in which the optic papilla is excavated.* This affection must be carefully distinguished from glaucoma, which may be done by observing that the globe is not tense, and the other signs of hyperæmia are also absent.

Morbid anatomy of glaucoma.—"The small blood spots which are sprinkled over the inner surface of the retina are small spots of capillary hæmorrhage. This condition was first recognized in glaucoma, by actual dissection, by Mr. Bow-

* "It is probable that those cases of amaurosis in which the optic nerve is involved in the atrophy, will present excavations of the optic papilla, whether glaucoma be present or not."
—Mackenzie.

man.* The bleeding proceeds from the capillaries in the inner layers of the retina, and the blood either spreads laterally amongst the elementary structures of the retina, or, bursting through the hyaloid membrane, forms small clots in the vitreous humour. The retinal capillaries are irregularly dilated and studded with small fusiform and globular enlargements—little aneurismal pouches. These dilatations do not occur in the large vessels. The pouches and the vessels communicating with them are usually crammed full with blood corpuscles. In the hæmorrhagic spots, the retinal tissues are infiltrated with blood discs, which have escaped by the bursting of some of these little aneurismal pouches. Excepting the changes described above, the retinal capillaries have a healthy appearance, and do not present traces of fatty or ætheromatous degeneration. The coats of the arteries are hypertrophied. The vitreous humour sometimes has a yellow tinge, which is derived from the colouring matter of the effused blood. It often contains blood discs and delicate fibrinous webs; and sometimes also small blood clots, which can be clearly seen with the unaided eye. The vitreous humour has a very remarkable degree of consistence, and does not quickly flow off

* Upon reference to Mackenzie, p. 896, it would appear that Mr. Bowman was not the first to notice effusions of blood over the retina in glaucoma; and Warnatz, in his book on glaucoma, published at Liepsic, 1844, p. 92, "mentions dark reddish spots and small ecchymoses in the retina," as having been found six times.

when the eyeball is cut across. Viewed by transmitted light, the glaucomatous lens has a yellow tint like the vitreous humour, and which is probably acquired from the same source—viz. the colouring matter of the effused blood.* The relations of the lens and the vitreous humour favour this supposition. In none of the dissections were any morbid changes found in the choroid, unless when staphylomata were present. Corresponding with the staphylomata, the choroid, retina, and scleroticæ preserve their natural relations to one another, and are not separated by any effusion. The choroidal pigment is irregularly distributed, and the tissues seem opened out.

* Dr. Mackenzie says: "Most assuredly the yellow tinge of the glaucomatous lens is owing, not to the colouring matter of 'effused blood,' but to a slow organic change, attended with dryness and hardness, commencing in its centre and spreading slowly towards the surface. On this change depends the diplo-chromatic property acquired by the lens in glaucoma, by means of which it absorbs the rays at each end of the prismatic spectrum, and reflects the middle, or green ones, and gives rise to the earliest objective origin of the disease—the origin whence the name glaucoma has arisen. And as to the choroid, numerous changes have been met with on dissection; such as a varicose state of vessels, congested, adherent to retina, thickened, thinned, exudation between it and retina, deficiency of pigment, ossification on its inner surface, &c. It would be wrong to suppose intra-ocular pressure to arise without serious organic changes in the surrounding parts, especially the choroid, and chiefly that portion of it upon which the nutrition of the crystalline and vitreous depends, namely, between the *ora serrata* and the edge of the crystalline."

The subsequent changes in the retina and choroid, in the advanced stages of the disease, have an atrophic character. The dilated retinal capillaries and their contents have been found, dark and granular, in a state of fatty degeneration, and the contiguous parts of the retina participate in these changes. The symptoms, the ophthalmoscopic signs, and the structural changes which take place early in the disease, all point to a state of great vascular excitement in the retina, and a greatly increased internal pressure upon the walls of the globe. It is this pressure which causes the blindness in the early stage of the disease, and the fixed dilated pupil. Thus the ophthalmoscope and microscope are beautifully illustrative and confirmatory of each other.

“Gräfe describes his treatment of the disease in an elaborate article in the second part of the third volume of the ‘Archiv für Ophthalmologie,’ published at Berlin, October, 1857. How to diminish the augmented pressure, and so to restore the natural tension of the eye-ball, was the specific object in view; for he was convinced by the visible pulsation in the central artery of the retina, by the cupped state of the entrance of the optic nerve, by the hardness of the eye-ball, and by other symptoms, that the tension of the globe was greatly increased; and he rightly ascribed the blindness which takes place so early in the acute form of the disease, to the effect of pressure upon the retina and the entrance of the optic nerve, rather than to any structural changes already taking place in these parts.

“Gräfe recommends that a portion of the iris be excised; which should be larger in proportion to the intensity of the

symptoms and distension of the globe. Mr. Bowman adds : ‘much care is necessary in making the incision ; the small size of the anterior chamber, consequent on the advance of the lens, demands great caution in directing the point of the knife ; and if the chamber is opened by a simple puncture, which is subsequently enlarged by a sawing movement, the difficulties may be increased by the immediate escape of the aqueous humour, and the knife becoming entangled in the iris, or wounding the lens before the incision has been enlarged to the desired extent. The knife therefore, when once entered, should be pushed steadily but slowly onwards, so as to cut its way out ere the escape of the aqueous humour allows the iris to fall before its point or edge. When the incision is complete, the iris bulges a little through the margin of the wound ; it should now be gently drawn out with the forceps, and be cut off with scissors at each angle of the wound.’ The incision is recommended to be made at the inner side of the cornea ; but Mr. Bowman prefers making it above, because, while he considers it a matter of indifference, as far as regards the relief of tensions, which part is excised, he believes that the cover thus given by the upper lid to the margin of the lens, which has been exposed by the removal of the iris, contributes to the perfection of vision, the central part only of the lens being usually uncovered.

“ The operation is more successful in those cases where pain and increased tension of the globe are co-existent ; the more acute the case, the greater the hopefulness, provided the operation is performed early enough. Relief to the tension brings relief to the pain, and often benefit to vision ;

the latter, however, does not generally follow immediately.”* Any benefit which arises from iridectomy may be ascribed to the evacuation of the aqueous humour, and bleeding from the cut iris. Mackenzie long since recommended paracentesis cornea, and paracentesis sclerotica—repeated evacuations of the dissolved vitreous and aqueous humours. At page 899, *Diseases of the Eye*, he writes : “As a superabundance of dissolved vitreous humour appears to form an essential part of the morbid changes observed in the advanced stages of glaucoma, it is not unreasonable to conclude that occasionally puncturing the sclerotica and choroid might prove serviceable, by taking off the pressure of the accumulated fluid on the retina. The puncture should be made with a broad iris-knife, at the usual place of entering the needle in the operation of couching. The instrument, pushed towards the centre of the vitreous humour, is to be turned a little on its axis, and held for a minute or two in the same position, so that the fluid may escape. A transient amelioration of vision, as well as relief from pain, is sometimes the result of the operation, or even of that of puncturing the cornea, and evacuating the aqueous humour.” Very nearly the same operation was recommended by Mr. Middlemore, in his treatise on *Diseases of the Eye*, published 1835. Mackenzie likewise proved that the absence of the crystalline arrests glaucoma.

From the few cases which have fallen under my own observation, I must say that I am not sanguine of the ultimate value of iridectomy; nor, before a year or two shall have

* Mr. J. W. Hulke, *Medical Times*, March, 1858.

passed over, can this operative procedure be said to be successful. I fear, in most of these cases, a return of the disease; and then disorganization will assuredly proceed to destruction of the organ of vision.

AMAUROTIC DEFECTS OF SIGHT, AMBLYOPIA, &c.

I shall now proceed to offer a few remarks upon amaurotic defects of sight proceeding from changes in the retina and choroid, the pathological indications of which are so very obscure, that their diseases are rendered perhaps more liable to mistreatment than that of other tissues.

“Amaurosis implies no definite and ascertained disease; it is only a word expressive of our own ignorance as to the causes of our patients’ blindness.” That it is an *obscurity of vision* depending on some morbid change of the optic nerve itself, or from the retina becoming incapable of receiving the impression of external objects through the medium of light, is, I believe, an accurate and well-established fact. There is, however, “no subject in ophthalmology more likely to receive additions and corrections, in proportion as it is investigated on sound pathological principles, than the very obscure disease, amaurosis.”* In its various forms, stages, and degrees, we shall, I doubt not, find the ophthalmoscope of the greatest value; since with it we can at once determine whether the disease is in the acute or chronic form, in the confirmed or inveterate stage, or is one of atrophy of the nervous and arterial systems.

* Dixon’s *Practical Study of Diseases of the Eye*.

I may, however, venture to affirm, that amaurosis is divided into, first, sensorial, having its seat on the retina, optic nerve, or optic tubercle; second, cerebral, as when it arises from diseases in the hemispheres of the brain, water in the ventricles, or tumours attached to the dura mater; third, spinal, when it springs from disease of the fifth nerve, and is attended by ocular anæsthesia; fourth, ganglionic, as when affections of the digestive or the generative system give rise to it. It is chiefly with the first, or sensorial, and the fourth, ganglionic, that we have most frequently to deal, at the hospital, and in the investigation of which the ophthalmoscope is found of the utmost importance; especially in cases of congestion or inflammation, or where changes of form, colour, or vascularity of the nervous structure, are combined with the more immediate cause of disease. The instrument also possesses a certain negative value in other cases, as by its aid we are enabled to say that the disease is *not sensorial*, and consequently must be referred to some other cause; ever keeping in mind the important fact, that large numbers of cases of amaurosis take their origin, not in the eye, but in the sympathetic irritation excited by disease of near or remote organs, such as caries in the teeth, excessive indulgence in smoking or chewing tobacco, spirit drinking, disordered stomach, bowels, liver, kidneys, and uterus; in exhaustion after fevers, great losses of blood in child-bed, and by prolonged suckling. It often arises not from local, but from constitutional causes; and what adds to the difficulty attendant on the etiology of this melancholy disease, not unfrequently, in one and the same case, different causes, or even opposite

kinds of causes, combine in its production. Bright's disease may occasion loss of sight. I have lately seen a well-marked instance in a patient afflicted with Bright's disease : only a few months since the sight of the right eye became dim, and has gone from bad to worse. Many of my cases are an exemplification of the value of attention to minor points in diagnosis.

As far as regards the amaurosis of Bright's Disease, M. Quadri made a communication to the Brussels Congress,* in which he said that blindness, more or less complete, was a symptom accompanying Bright's disease. This symptom was first observed by Landouzy, and later by Trosseau, Roux, Forget, Cunier, and Bretonneau. M. Quadri has had one case where vision was impaired in such a manner that objects seemed enveloped in a thick mist, and were scarcely visible at a distance of more than two feet ; and fixed objects appeared to be oscillating. On examination with the ophthalmoscope, the retina seemed almost completely separated. It had the appearance of a floating body, and became tremulous when the eye moved. The œdema may appear or disappear, but its disappearance does not reproduce the power of vision. Dr. A. Wagner† refers to the lesion in question as having been first demonstrated by Türck. In four years, Wagner has met with eighteen cases of retinal affection in 157 cases of Bright's disease. In three cases vision was not impaired, in other three it was more or less imperfect, and the ophthalmoscope revealed

* *Compte-rendu du Congrès d'Ophthalmologie.*

† *Archives Générale de Médecine* ; May, 1858. From Virchow's Annal.

an abnormal condition of the vessels in the deeper structures. In ten cases the anatomical lesions were considerable, and vision was proportionately impaired. In one case there was total blindness. The superficial parts of the eye were healthy, as well as the lens and vitreous humour; the latter in one case, however, presented slight opacity. There was, generally, hyperæmia of the arteries and veins of the retina alone, or of the choroid also, and an opacity at the bottom of the eye. The opacity, which had a smoky appearance, commenced in the optic papilla, and extended thence in irregular forms, and appeared to be underneath the vessels. As the opacity increased, the vessels diminished; very generally there were punctated extravasations of blood in the neighbourhood of the optic nerve. The deposits under the microscope were of a fatty character, in addition to minute extravasations of blood and deposits of a probably fibrinous nature. The optic nerve was unimpaired."

The invasion of the amaurosis may be sudden or gradual. In the former case, vision may be at once wholly lost, or nearly so; in the latter case, it may be some time before it is seriously impaired. In some cases the impairment of vision remains at a certain stage without advancing, in others it continues to increase, the obscurity thickening and spreading until the whole field of vision is obliterated, and the perception of light lost; the amaurotic disease is then complete. Except when the case is of a purely local nature, both eyes generally become affected; one eye first, and then the other.

I must not pass over another form of the disease, which

is often seen in the out-patients' department of the Royal Westminster Ophthalmic Hospital, during the winter season especially; viz. traumatic congestion of the retina, as a cause of amaurosis.

Wounds of the eye-brow, which injure the frontal nerve, frequently produce amaurosis; the amblyoptic symptoms coming on, in some cases instantaneously, and in others long after the wound has been healed.

“Morgagni mentions having seen a case of amaurosis produced by a wound above the eye-brow, which, he observes, explains a passage of Hippocrates. ‘The sight,’ says the Father of Medicine, ‘is obscured in wounds which are inflicted on the eye-brow or a little higher.’ This curious fact I have seen illustrated in several instances, and is an example of the sympathy which exists between parts whose nerves have a direct communication; the ophthalmic branch of the fifth pair sending off the frontal nerve, and also a twig to join the third pair to form the lenticular ganglion.

“It is only when the frontal nerve is wounded or injured, and not divided, that amaurosis takes place; amaurosis following a wound of this nerve, may sometimes be cured by making a complete division of the trunk nearest its origin. Portal saw a child, who received a slight puncture on the forehead with the point of a knife, which was followed by a considerable convulsion of the upper eye-lid. This ceased when the incision was enlarged at the place of puncture.”*

A gentleman received an oblique cut in the forehead,

* Wardrop's *Morbid Anatomy of the Eye*.

which, from its direction and depth, must have injured the frontal nerve. The wound was not accompanied by any severe symptoms, and soon healed. But afterwards the vision of this eye began to fail, and in a few months was completely destroyed; the pupil was much dilated, the iris was not influenced by variations of light, and had a slight tremulous motion.

Magendie, in his Lectures on the Physiology of the Nervous System, pointed out an important connection subsisting between the branches of the fifth pair and the retina. He observes: "The integrity of both the optic and the fifth nerves is indispensably necessary for the exercise of vision, which is lost whenever either of the nerves is separately destroyed."

Again, in speaking of amaurosis, he says: "It cannot be considered as a simple affection of the optic nerve; at least, in the actual state of the science, it is generally impossible to say that the fifth nerve has no connexion with the loss of sight, and in many cases the connexity is evident. Hence a rule which I invariably follow, of directing my remedies, in the first instance, to the frontal nerve; and I have frequently had the satisfaction of observing some of these cases of incomplete amaurosis improve sensibly under the influence of therapeutic agents applied to the fifth pair. I would go even further, and say, whenever you have a case of incipient amaurosis, commence by acting on this nerve, for it is at once the most expeditious and efficient method."*

* In many cases I have found the application of a stimulating liniment over the orbit, attended with considerable

Alterations in the retina change and obscure the normal aspect of the choroid; exudations between the retina and choroid, or into the substance of the latter, will have a similar effect. Should the retina become detached from the choroid by serous effusion, the retina is then pushed forwards towards the lens; the ophthalmoscope detects this abnormal condition and its extent with certainty. The periphery of the optic nerve apparently limits the further extension of the effusion, and the infiltrated or detached part becomes raised around, and hangs over it; the raised portion has a more or less opaque and pinkish appearance; sometimes it is sufficiently transparent to permit of the choroid being seen through it. On several occasions I have noticed a mass of pigment deposited and exposed around some portion of the optic nerve, generally at its periphery; or large masses collected together as fixed black spots upon an anæmic-looking choroid with diseased retina. Paleness of the choroid as seen with the ophthalmoscope is often owing to morbid thickening or opacity of the retina.

Gräfe directed particular attention to the detachment of the retina from the choroid by extravasation or exudation; as well as by exudation of plastic lymph, the production of tubercular disease, and by malignant growths. Donders has carefully investigated and represented colloid degeneration of the pigmentary cells of the choroid. Congestion of the choroid (choroiditis), and anæmia of this structure, so frequently met

benefit. The vapour of the bisulphuret of carbon applied to the external eye, is an excellent stimulant, and very useful in myodesopia and certain cases of amblyopia.

with, always exhibit a peculiar train of *subjective* symptoms, so that we may, by the more careful examinations we are now enabled to make with the ophthalmoscope, readily recognise such organic changes;* and at all events, if the external indications are at times obscure, we have now the certainty of not mistaking an anæmic for a congested condition of the choroid and other tissues; and with this instrument alone we can determine the disease and the amount of impairment of vision, without being under the necessity of putting many questions to our patients, and asking of what they complain.

“The presence of perfectly white spaces in the choroid is worthy of notice, and appears to indicate in such spots the obliteration or bloodlessness of the choroid; a general pallor of the whole interior, and especially of the optic nerve, which appears larger than in the normal eye, is an accompaniment of such a change.”†

* “In choroiditis and retinitis, the appearances, as hitherto observed with the ophthalmoscope, are more frequently those of past inflammation, than of an active state; they are, congestions, spots of extravasated blood, opacities of various degrees, and pigmental deposits. Some of the opaque appearances are indications of exuded matter deposited between the choroid and retina, producing adhesion of the two membranes, with alteration of their textures, including the pigment membrane of the one and *stratum bacillosum* of the other; and this has been frequently confirmed by dissections. The retina bulged forward and tremulous, is an indication of serous exudation between the choroid and it on the one hand, and dissolution of vitreous humour on the other.”—*Wharton Jones's Ophthalmic Medicine and Surgery*.

† Gräfe, Archiv. ii, p. 285.

“The bright white appearance of the spots when seen with the ophthalmoscope, is due to the large amount of light reflected by the inner surface of the sclerotic in the absence of the pigment-epithelium of the choroid.

“These changes sometimes affect very extensive portions of the choroid, which is marked with large white patches, across which the retinal and larger choroidal vessels may be seen coursing. These appearances are often highly marked in children with imperfect sight and rolling globes. In an eye affected with ciliary staphyloma and hydrophthalmos, these changes had taken place to a much greater extent than in any other instance I have had an opportunity of examining. The whole globe was much enlarged, and the ciliary staphyloma was also large, embracing about a third of the whole circumference of the globe in this region. To an extent corresponding with the staphyloma, the sclerotic and the ciliary body were highly attenuated. The tissues of the ciliary body appeared stretched, cracked, and opened out, and the ciliary processes appeared as slender, widely separated lines, adhering to the thinned sclerotic which could be seen between them. Just behind the ora serrata there was a narrow zone of tolerably normal choroid, but behind this the choroid and retina seemed to have disappeared, leaving the sclerotic apparently uncovered and sprinkled here and there with a few black, woolly flocculi. The absence of these membranes was only apparent. A more careful examination of the parts verified the existence of both choroid and retina. They adhered most firmly to one another, and to the sclerotic, and could with

difficulty be separated. The retina was atrophied, its vessels in a state of fatty degeneration. At one or two points, traces of rods and bulbs were seen, but elsewhere all was dim and granular. The choroid was also atrophied. The hexagonal pigment-epithelium had everywhere disappeared, excepting at the black flocculi, which were formed by little groups of epithelial cells, misshapen and crammed with pigment-grains, and the stellate pigment-cells in the stroma were very sparingly present. The vitreous humor was much increased in quantity, and fluid, with the exception of a very thin layer lining the surface of the retina. It is interesting to observe that the fluid distending the globe occupied the vitreous space, and that the tunics of the eye-ball were everywhere adherent to one another.

“I have given the details of this examination because it illustrates the changes which are indicated by these white patches. As I have already mentioned, they are not uncommon in children with imperfect sight and rolling globes. In these cases, they are often congenital, and it is not improbable that they result from intrauterine inflammation. White patches are also associated with posterior sclerotic staphyloma; the choroidal pigment layer seems cracked and opened out. These staphylomata often are produced by circumscribed spots of inflammation of the choroid and sclerotic—the “*Sclero-choroidite posterieure*” of Desmarres and Sichel. White patches and spots, then, which are caused by absence of the pigment-epithelium of the choroid, are in some instances a result of previous inflammation—inflammation which has ended in

atrophy of the inflamed part, and also disappearance of the inflammatory exudations.”*

SCLERO-CHOROIDITIS POSTERIOR.

“This is a disease of very frequent occurrence, especially in short-sighted persons. The sclerotic and choroid become thinned, and bulge out into a conical projection at the back of the eye-ball, to the outer side of the optic nerve. The antero-posterior diameter of the eye being thus lengthened, myopia is produced, or aggravated if it had been previously present. Farther, the eye is forced slightly forwards and inwards, and impeded in its outward movement, and more of the sclerotic than usual is seen towards the outer commissure. Sclero-choroiditis posterior, or staphyloma posterior, is sometimes progressive, and causes serious injury to vision; more commonly it remains stationary, after having merely altered the focus of the eye. If we observe that the eyes of a short-sighted person are convergent, that the sclerotic is of a bluish colour, and slightly prominent when the eye is turned inwards, and that the concave glasses which he uses are rather deep, we may have a strong suspicion that he is affected with sclero-choroiditis posterior; and this suspicion will amount almost to a certainty, if we find that the vision is becoming shorter, that there are *muscæ volitantes*, photophobia, &c. The ophthalmoscope will at once decide the point.

“*Ophthalmoscopic Characters.*—In the early stage of the

* Mr. Hulke on the Morbid Anatomy of the Choroid and Retina.—*Ophthalmic Hospital Reports*, January, 1858.

disease we find a spot of a brilliant white colour and crescentic form, in contact with the optic disc, and always on its outer side. It may appear to project inwardly, but is really depressed below the level of the surrounding parts, as has been proved by post-mortem examinations. Its transverse is greater than its vertical diameter; its outer margin is ill defined, and frequently bordered by a dark grey or black line, due to the accumulation of pigment. As the disease progresses, the spot extends outwards and slightly downwards, preserving somewhat of a triangular or conical shape, the apex being rounded. As it continues to extend outwards, the horns of the crescentic part gradually creep round the optic disc, until finally they meet and surround it completely. In still more advanced cases, a second cone commences at the inner side of the optic nerve; it is always smaller than the first, though of the same general appearance. Together, they form a large patch of a brilliant white colour, surrounding the optic disc, which always preserves its distinct outline; the margin of the spot in such cases is irregular and ill defined. The retinal vessels pass over the spot without any change in their arrangement or direction, thus indicating the presence and integrity of the retina.

“Numerous post-mortem examinations have been made of eyes in this condition, and the following are the results: The vitreous humour is sometimes fluid, and often contains fine flocculent opacities. There is often a small opaque spot on the posterior central surface of the lens. The retina is unchanged. The white spot has irregular edges, and is marked here and there with pigment. The choroid is atrophied to a

variable extent; in the white spot—in other words, in the staphyloma—nothing remains but the rudiments of it, covered with pigment, in the vicinity of the vessels. This complete disappearance of the choroid, however, is denied by Dr. E. Jaeger, who has found the continuity of the membrane complete in twenty-three instances in which he has examined the eyes after death. Thus it appears that the white spot is caused by the light reflected from the sclerotic through the choroid deprived of its pigment. The sclerotic is thinned, transparent in the staphylomatous part, and here and there adherent to the choroid; the greatest prominence is at the *macula lutea*.

“It may be complicated with the following affections. Softening of the vitreous humour, with floating particles, visible when the eye is moved rapidly; less frequently, opacities on the posterior surface of the lens; in severer cases, detachment of the retina by serous effusion; sub-retinal effusion of blood, occasionally escaping into the vitreous humour, and producing turbidity; and staphyloma anterior.”*

HYDROPTHALMIA POSTERIOR.

“A student, aged 22, of a scrofulous habit, but tolerably healthy, for about nine months had suffered loss of sight in the left eye. He had a sensation of sight when a strong light was allowed to fall on his eye, but could not recognise objects. The eye was irritable and always suffused with tears. The vessels of the conjunctiva were much increased, and the pupil

* M. Desmarres. *Medical Circular*.

a little dilated and sluggish. The fundus had a greyish appearance, with a striped series of vessels running over it.

“The vessels of the retina had a tremulous motion when the eye was moved. The optic nerve, which, on account of the altered position of the optic axis, could scarcely be seen, appeared of a yellowish grey colour.

HYDROPTHALMIA WITH CHOROIDITIS.

“A healthy-looking journeyman, aged 68, had, for several months, a progressive decrease of sight in the left eye. The conjunctiva showed an increase in the number and size of its vessels, the sclerotica appeared blue on its deeper surface. The iris of this eye was greyish, whilst the healthy eye appeared blue. The fundus was greenish, but the lens perfectly transparent. By directing the patient to look upwards and downwards, an irregular dark cloud appeared from below, and again disappeared. The pupil was more dilated than in the other eye, and the optic axis had a somewhat divergent direction from the healthy eye. Three weeks after this investigation, the patient observed a number of star-like bodies, and the sight had become much more disturbed. With the ophthalmoscope, the retina below and towards the outer side appeared lifted from the choroid, the effusion giving to it the appearance of an elevation; by causing the eye to move up and down, this had a wavy motion. The retina was greyish white, and the optic nerve bluish grey; the vessels of the retina numerous, and ramified in a varicose state. Such are the appearances presented in *Hydrôphthalmia posterior*.”
See *Frontispiece*, No. 5.

“We must,” observes Ruete, “ever place confidence in the diagnosis of Hydrophthalmia as given in these cases. The treatment of which consisted in leeching, and small doses of mercury, followed by a combination of purgatives with diuretics, and at a later period tonics; but, although the patients were considerably improved, the sight remained imperfect. It is interesting to know that, notwithstanding the unlimited dissolution of the retina from serous exudation, the patients had some perception of light from the commencement.”* The local application of Tinct. Digitalis has been employed in Hydrophthalmia with much success.

HYPERÆMIA.

“In hyperæmia of the choroid, the membrane is of a more vivid red than usual, and the normal condition of the pigment has disappeared, or is obscured. As the colour of the healthy choroid varies, within certain limits, with the complexion of the individual, the injection will be much more apparent in fair than in swarthy subjects; but we may form a pretty accurate estimation of its extent by observing the condition of the optic papilla and retina, whose vessels are always congested in similar proportion to those of the choroid.

“Hyperæmia of the choroid is present in many diseases of the fundus of the eye, and is of importance in proportion

* Bildliche Darstellung Der Krankheiten Des Menschlichen Auges. Von Dr. Theodor Ruete. Leipzig, 1854.

its duration. In some cases of granular ophthalmia it is seen in its simple state, accompanied, as usual, by injection of the retinal vessels.

“Maceration of the pigment, which indicates commencing atrophy, is the result of long-continued hyperæmia, and is the principal symptom of chronic choroiditis. It first appears as a spot of yellowish orange colour, near the optic nerve; from this spot the choroidal pigment has disappeared to such an extent as to permit us to see the choroidal vessels, which are of a yellowish orange colour, and arranged in a regular net work. This orange tint rarely becomes general, but is confined to the neighbourhood of the optic papilla; but in severe cases of long standing, it may extend, spot by spot, towards the more remote parts. I believe that it indicates commencing maceration of the pigment, which itself is only one of the characteristics of atrophy of the choroid.

“As the disease progresses, the choroidal vessels become at first more distinct, but ultimately disappear altogether, leaving a whitish surface, over which the retinal vessels ramify. These latter in their turn also disappear, leaving the spots perfectly white; insomuch that at first they were universally mistaken for exudations; they are now correctly attributed to the complete absorption of the pigment, leaving the choroid colourless.

“At the same time, the pigment which has disappeared from some places, reappears in others, in the form of grey or deep black spots, which are irregular in shape, and size. In commencing choroiditis they are few in number; in advanced cases they are so numerous that the fundus of the eye is

streaked like the skin of a tiger. With the spots are often seen small extravasations of blood, which remain for a long time unabsorbed. It often happens that the vessels of the retina can be seen passing over these black spots, showing that they are situated between this membrane and the choroid.*

This condition of the eye is compatible with a fair amount of vision, so long as the region of the *macula lutea* is unaffected.

“Plastic exudations are of common occurrence in chronic choroiditis, and are frequently associated with the spots of pigment above described. They are also seen after various disorders of the fundus of the eye, such as sub-retinal dropsy, serous detachment of the retina, sclero-choroiditis, &c. They are known by their shape, which is generally elongated, in the form of a band, and by their bluish colour; by these characteristics they are readily distinguished from the spots caused by atrophy of the choroid, which are of a more or less round shape, and silvery white colour.”—*M. Desmarres*.

The ophthalmoscope unmistakably shows us that when effusion takes place, it alters the character of both choroid and retina, and that inflammatory injection of the former can be easily

* Mr. Nunneley believes, from microscopical examination, that “the figures of the motes, in the abnormal condition of *muscæ volitantes*, resemble exactly portions of the choroid coat when teased out and magnified; and that such might be expected to appear and disappear with the varying condition of the vessels, arising from disordered stomach or the cerebral circulation; and be cured by whatever corrects these conditions.”

distinguished from that of the latter, for not only is there a change in colour, but often a shrinking of the retina and a cupped or sunken appearance about the nerve, separating the choroid and retina further from each other. We might, *à priori*, have supposed, from the difference in the seat and definition of the vessels of the retina and choroid, that changes in either structure might be readily made out; and, from the anatomical and physiological relations of the two membranes, we might infer that, when exudation occurs, great imperfection in vision must follow, and become the immediate cause of blindness.*

* Anatomical research has shown us that the retina is not simply an expansion of the optic nerve. "After entering the eye, it expands, and lines the inner surface with a layer of fibres; but beneath this layer is one of cells, not distinguishable from those of the brain; and beneath that, one of granules; beneath this layer again, is another of perpendicular rods and cones (the membrane of Jacob). So that we have four distinct layers, very dissimilar in structure, and, of course, very different from the optic nerve, which is simply fibrous. Instead of regarding the retina as composed of layers, however, we are now generally agreed in considering that the fibres of the optic nerve pass *radially* through the retina; thus from the fibres a thread passes downwards, till it meets a cell of the vesicular layer; this, in turn, is in connection with a granule of the granular layer, which terminates in a cone and rod; these latter forming the real termination of the optic fibres on the pigment layer of the choroid coat. It is now held that the rods and cones are the percipients of light, which they communicate to the cells of the vesicular layer, thence to the optic fibres, and thence to the optic ganglion. The point to be borne in mind in this description is that the sensitive part of the retina is not the surface on

Morbid anatomy assists us also, in coming to this conclusion. Mr. Wardrop says:—

“I have had opportunities of dissecting several eyes

which the light immediately falls, but the surface which is in contact with the black pigment.

“So that, if we suppose an image to be formed on the retina, it will not be transmitted to the brain; but it will excite the specific sensations of which the optic centre is alone capable, and *these* will be transmitted. But it will be easy to prove that no images can be formed on the surface of the retina. In the first place, the retina, during life and health, is as transparent as glass. The rays of light must therefore pass through it, and enter the pigmental layer, which, being perfectly black, absorbs all the rays. Further, it has been proved that the optic fibres are *totally insensible* to light. There is the ‘blind spot,’ where the optic nerve enters, and where nothing but nerve fibres exist. There is also a spot in each eye where the sensitiveness to light is at its maximum; and this is a mass of cells, without a continuous surface layer of fibres. The apparatus that exists for the reception of light rays, out of which the necessary images are formed, Professor Draper maintains to be the *pigment layer*. To prove that this is the real optical screen on which the images are formed, he reminds us of Franklin’s experiment, of placing variously-coloured pieces of cloth in the sunlight on the snow, and so arranged that the rays should fall on them equally. After a certain period, he examined them, and found that the black cloth had melted its way deeply into the snow, the yellow to a less depth, and the white scarcely at all. The conclusion which he drew has since been abundantly confirmed; namely, that surfaces become warm, in exact proportion to the depth of their tint, because the darker the surface, the greater the amount of rays absorbed. A black surface, absorbing all the rays, becomes the hottest. This principle Professor Draper invokes in his examination of

where a serous fluid had collected between the choroid coat and retina. In these cases, the retina and vitreous humour were more or less absorbed, whilst the retina was shrivelled

the eye; and he insists "that the argument against the retina being the screen on which images are formed, are, both optical and anatomical, perfectly unanswerable. During life, it is a transparent medium, as incapable of receiving an image as a sheet of clear glass, or the atmospheric air itself, and its sensory surface is its exterior one—this is the one nearest the choroid coat. But the black pigment, from its perfect opacity, not only completely absorbs the rays of light, turning them, if such a phrase may be used, into heat, no matter how faintly they may be, but also discharges the well-known duty of darkening the interior of the eye. Perfection of vision requires that the images should form on a mathematical superficies, and not in the midst of a transparent medium. The black pigment satisfies that condition; the retina does not.

"If the retina is insensible to the light which passes *through* it, it will be equally insensible to the light which is reflected from the pigment layer. On the other hand, although the pigment layer is capable of absorbing light, we cannot suppose it also sensitive to light. How, then, is the luminous sensation produced? Professor Draper furnishes an answer to this: "The primary effect of rays of light upon the black pigment is to raise its temperature, and this to a degree which is in relation to their intensity and intrinsic colour; light which is of a yellow tint, exerting the most energetic action; and rays which correspond to the extreme red and extreme violet, the feeblest. The varied images of external objects, which are thus painted upon the black pigment, raise its temperature in becoming extinguished, and that in the order of their brilliancy and colour. *In this local disturbance of temperature, the act of vision commences*; this doctrine being in perfect harmony with the anatomical

up and formed a white bundle, extending through the centre of the eyeball, from the entrance of the optic nerve to the

structure of the retina, the posterior surface of which is its sensory surface, and *not the anterior*, as it ought to be, if the explanation usually given of the nature of vision is correct; and, therefore, as when we pass the tip of the finger over the surface of bodies, and recognise cold and warm spaces thereupon, the same process occurs with infinitely more delicacy in the eye. The club-shaped particles of 'Jacob's membrane' are truly tactile organs, which communicate to the sensory surface of the retina the condition of temperature of the black pigment. Professor Draper's experiments satisfactorily prove that all photographic effects result from high temperature: 'The impinging of a ray of light on a point raises the temperature of that point to the same degree as that possessed by the source from which the ray comes; but an immediate descent takes place through conduction to the neighbouring particles. This conducted heat, by reason of its indefinitely lower intensity, ceases to have any chemical effect, and hence photographic images are perfectly sharp on their edges. It may be demonstrated that the same thing takes place in vision; and in this respect it may almost be said that vision is a photographic effect, the receiving surface being a mathematical superficies, acting under the preceding condition. All objects will, therefore, be definite and sharply defined upon it; nor can there be anything like lateral spreading. If vision took place in the retina as a receiving medium, all objects would be nebulous on the edges.

"To explain the process by which the change of temperature in the pigment becomes a luminous sensation, will not be difficult, if—remembering that the luminous sensation is one not depending on the specific stimulus of light, but on the specific nature of the optic centre—we follow this change in its passage from the pigment to the rods and cones of Jacob's

posterior part of the capsule of the lens. The choroid coat was unchanged."

Mr. Ware mentions a case in which the choroid was

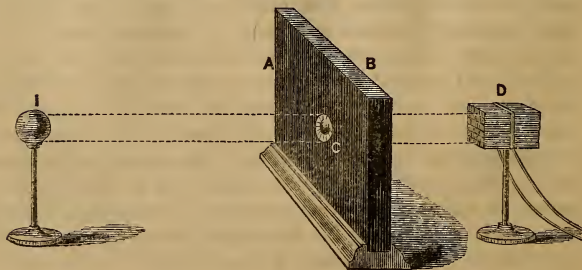
membrane, which it affects; these are in direct connection with the ganglionic nerve-cells, in which we suppose the nervous impression to be excited; this impression is thence transmitted by means of the optic fibres to the optic ganglion, and thence it becomes a sensation. Funke has a good illustration of this. 'The wave of light,' he says, 'can no more excite the optic nerve *directly*, than the pressure of a finger on the air, or the walls of the organ-pipes can excite musical notes. The finger produces a tone by pressing on the keys; each particular key that is pressed brings forth a corresponding tone as the air enters the pipe. In this illustration, the optic fibres are as the organ-pipes, the rods and cones of Jacob's membrane as the keys, and the wave of light as the air. But the most convincing argument against the retina as the receiving screen of images, and in favour of the pigmental layer, is, in my opinion, to be found in the eyes of the invertebrata, where the *pigment* is in *front of the retina*, instead of behind it, as in the vertebrata. In the eye of the Cephalopoda, this position of the pigment has long been a puzzle; and Professor Owen says that it must doubtless be 'perforated by the retinal papillæ, or otherwise a perception of light must take place, in a manner incompatible with our knowledge of the ordinary mode in which the retina is effected by luminous rays.'

"In the crab's eye, the pigment layer covers the retina; in the blind Crustacea, no pigment is present: and in Albinos, in whom the pigment is deficient in colouring matter, the vision is very imperfect. In the Nudibranchs, vision is simply the perception of light and darkness. The changes of temperature produced by the absorption of the rays in their pigment, cannot be elevated into the perception of an image, because the optical conditions for the formation of an image are absent; an indefinite sensation, resulting from change of temperature,

diseased ; on dissection, he found “ a considerable quantity of yellow-coloured fluid, as thin as water, accumulated between the choroid coat and retina ; the retina itself having collapsed,

is all that they can perceive ; nay, even were their eyes so constructed as to form optical images, there is little doubt that vision, in our human sense, would still fail them, owing to the absence of the necessary combination of tactile sensations with sensations of light. We see very much by the aid of our fingers. If we remember that, according to the hypothesis, light only affects the retina after changing the temperature of the pigment, which change is communicated to the rods and cones, and thence to the vesicular layer, there will be nothing irreconcilable in the inverse arrangements of the retina in invertebrata ; in both, the process is essentially the same ; and mere difference of position is not more than the difference of the chain of ganglia, which, in the vertebrata is dorsal, and in the invertebrata ventral.”—*Quarterly Review*.

Dr. Tyndal's experiments will greatly modify in effect the views here propounded with regard to the disturbance said to commence with the absorption of the *heat ray*. He proved that substances containing hydrogen oppose the passage of the longer vibrations of the heat rays, and allow the shorter vibrations of the light rays to pass ; and consequently the aqueous humour destroys the heat rays, or does not allow them to pass through it to the retina. In order to show this experimentally,



and resembled a cone of white colour, the apex of which was at the entrance of the optic nerve, and the base surrounded the crystalline body, the vitreous being absorbed."

let A B be a narrow vessel with its side painted black, C a round hole about half an inch in diameter, I a hot iron ball, D a thermo-pile; the rays of heat from I will pass through the aperture C, and falling on the pile D will deflect the galvanometer. If an ox-eye be now adjusted to, and accurately fill up the aperture C, no heat will pass through it—the galvanometer remains stationary, thus proving that the aqueous or vitreous humour, or both, opposes the passage of the rays of obscure heat. So that, unless it can be shown that the action of light upon the living body differs very materially from that here shown to be exerted upon a morbid structure, we must look to other disturbing causes to explain its marvellous action on the rods and cones of the retina. The magnetic influence so generally exerted on our planet, by sun and moon, would be sure to set up some disturbance in a membrane so exquisitely sensitive as the retina; and its rods and cones, from their peculiar arrangement, be well suited either to collect and discharge the magneto-electric currents, or become the most delicate of galvanometers. The hexagonal cells and stellate arrangement observed in the pigmental coat of the choroid, may be accessory to the accumulation, or even originate, as ordinary battery cells do, the electric force, and thus become an auxiliary of no mean value in the production of visual impressions. We have also the chemical theory to fall back upon,—the *actinic* power of light—as seen in the photogenic processes. The researches of M. Niepcé clearly show that the three phenomena united in the sunbeam—heat, light, and chemical power, actinism—are absorbed and radiated differently according to the physical condition of the surfaces upon which the solar radiations fall. The laws regulating these absorptions and reflections have yet to be determined. Professor Moser demonstrated, that light and heat, *i. e.* the sun's rays, cannot

“When inflammation has taken place, I have seen the retina assume a buff colour, produced by serous effusion. In a lady who had suffered from arthritic amaurosis, I found one

fall upon a body of any kind without producing a disturbance, either molecular or chemical, and that bodies have the power of restoring themselves during the hours of darkness to the state they were in previous to the solar disturbance. He established also the fact, that there exists *latent* light, or the influence and principle of light in darkness; as well as rays that have been termed *continuating*; and to these he assigns the duty of prolonging an impression when once made upon, or begun in a body. The *continuating* rays in the spectrum are the red and yellow; by their aid we are enabled to develop an invisible image, when once a change or chemical disturbance has been set up, as on a chemically prepared surface. The experiment may be made as follows:—A prepared surface having been exposed in the camera-obscura, and impinged upon by a ray of light brought to a focus upon its surface, the change it has now undergone can be developed by placing it under, or exposing it to the action of yellow light (yellow or red glass), and by such means alone the picture may be made visible. This and other curious phenomena will one day help us to understand the use of the yellow spot of Soemmering, which must have an important office to perform in the eye, since we find it provided with a more delicate and vascular layer of retina, and in close contact with the optic nerve. The momentary impression of external objects is made to impinge here, from whence, in a manner the most incomprehensible, the impression is conveyed to the brain; there, amidst its wonderful convolutions, the image becomes fixed and retained with a greater or less degree of precision and intensity; and thus an indelible impress is received with the rapidity of an electric flash, to be reproduced at will with the same vividness years after the first momentary impression. Would it not also appear that in age we have the *continuating and sustaining*

large spot of the retina quite opaque and considerably thickened.

“Magendie found the retina converted into a fibrinous membrane. ‘All the posterior chamber was lined by a membrane which was white, fibrinous, firm, and in every respect resembling an aponeurosis.’

“The retina has been found thickened, and changed in its structure, in the eyes that have become disorganized.

“Beer has observed, in some cases of amaurosis, the vessels of the vascular membrane of the retina varicose. This is a change which very probably takes place in those cases of amaurosis where there are symptoms of congestion in the head, and where the disease is relieved by depletion. When the vitreous humour was evacuated from a lady’s eye affected with amaurosis, a profuse hæmorrhage came on soon after the operation, which probably arose from a varicose state of the vessels of the retina, as well as those of the choroid coat. In this instance, the vitreous humour had degenerated into an aqueous fluid, and varicose vessels were observed on the sclerotic coat towards its posterior wall.”—*Wardrop*.

In the right eye of a boy, aged 16, believed to be the subject of a fungoid growth, proceeding on to the destruction of the organ; upon its removal, I found, by the aid of the microscope, fatty degeneration and calcareous conversions of the retina, with crystals of cholesterine in the vitreous body.

rays increased by the tinge of yellow given to the lenses? And is it not designedly so, at a period of life when the sense of vision grows duller?

Softening of the Retina.—Dr. Bader proposes this title for an affection of the retina, hitherto included under the terms glaucoma and amaurosis. The diagnosis of this affection rests entirely on ophthalmoscopic revelations, which he describes as follows: "Illumination of the retina revealed the entrance of the optic nerve in too defined a manner, with a dotted bluish-grey watery appearance of the surface, marked chiefly at the outer edge. Three very small vessels passed through the centre of the right optic nerve, and disappeared at its periphery. Returning from the retina were four veins of normal diameter and colour, which passed out of the eye close to the periphery of the optic nerve. Through the left optic nerve four thin vessels passed and spread over the retina. Two veins terminated abruptly, as in the right eye. At a later examination, the cornea and lens were slightly misty." Iridectomy was performed with benefit.

The following case is both interesting and instructive, from the careful microscopical examination made after the removal of the right eye; iridectomy having been performed on the left:

"Case 2. *History.*—E. G. aged 55, observed, nine years ago, before the right eye, a grayish mist, which, commencing at the nasal side, steadily advanced, and within two years became so thick as to destroy all perception of light. Since then the eye had remained in a stationary condition; two years ago, during an attack of rheumatism, the same kind of mist, also advancing from the nasal to the temporal side, appeared before the left eye, and, steadily increasing, had reduced vision to mere perception of light. Neither before nor

during the loss of vision had there been any pain or inflammation of the eyes or the head. The patient had had two attacks of acute rheumatism—one eleven, another two, years ago, each of four months' duration. His health has always been good, with this exception; no hereditary taint can be traced.

“*Present Symptoms.*—Right eye: slightly turned outwards and upwards, the globe a little harder than normal, the colour of the sclerotic normal, the cornea transparent, but uneven; numerous and large veins return over the sclerotic, many of them emerging at the ciliary region, especially near the insertion of the superior and inferior rectus; the anterior chamber very small; the light brown iris and the gray uniformly opaque lens being pressed forwards; the pupil immoveable, oval, enlarged downwards. Left eye: same as the right, except that there are fewer veins emerging from the ciliary region of the sclerotic, and the lens retains its transparency, with a ring of black pigment deposited on its anterior surface.

“*Ophthalmoscopic Examination.*—Left eye: the media transparent, excepting the pigment-ring on the lens; the red choroid, and the islands of pigment, well seen. The optic nerve, at its entrance, round and well defined; its periphery formed by a narrow white ring surrounding its surface, the outer portion of which formed a bluish grey semicircle, its inner nasal portion had a dirty-white, finely dotted appearance. Through the latter the vessels passed in normal number and colour, but more than usually bent over the narrow white ring. Right eye, the lens opaque.

“*Dissection of the right globe immediately after excision* (80 and 500 indicate the magnifying powers used). The globe somewhat soft, its shape and size normal; the anterior surface of the cornea uneven, but transparent, its superficial lamina easily peeled off. The size, colour, and consistence of the optic nerve, and the connection with its sheath, normal. The aqueous humour transparent, containing microscopically many transparent granules, similar in size to those of the hexagonal cells; the shape of the pupil the same, after the escape of the aqueous; the iris and the lens have not been examined microscopically. The sclerotic opened opposite to the middle of the superior rectus, its tissue and connexion with the choroid normal.

“*Excision of a piece of the sclerotic.*—The so-called lamina fusca strongly marked, the outer choroidal surface of a deep dirty brown colour. *Excision of the corresponding piece of the choroid* ($\times 80$). The stellate pigment in great abundance, the choroidal tissue normal. The hexagonal pigment granules of a deep brown colour, many of the cells round. *Excision of the corresponding piece of the retina* ($\times 80$). *Choroidal surface.* The rods and bulbs normal; in the nerve cell layer (seen beneath them), many irregular yellowish brown lines of the shape of former blood vessels; these and shapeless gray patches interfere with the transparency of this layer. *Retinal surface.* The arrangement of the retinal vessels normal, the veins large, and the capillaries very numerous. When the nerve cell layer is dimly seen, and the retinal vessels also a little out of focus, a delicate

system of black dotted lines appears, which, overlying the vessels, resembles much the arrangement of the optic nerve fibres, which were nowhere visible.

Division of the globe into an anterior and posterior half.

The former preserved in glycerine [its interior (with the exception of the lens) of normal appearance]; the latter was used for examination. To the naked eye, the vitreous and retina of the posterior half transparent, normal; the tinge of the yellow spot hardly perceptible. The choroid and its pigment, normal; the optic papilla, instead of being a little above the level of the retina, forms a cup, its deepest part occupied by the opaque optic nerve fibres and the fascia cribrosa, its sides, by the sclerotic, choroid, and retina; the sclerotic projecting beyond the choroid into the cup, and forming a narrow white rim, over which rim the vessels return from the retina and bend, to descend along the sides, leaving it at the deepest part. Looking upon this cup, a bluish-gray semicircular shadow is seen, which, on moving the eye, changes its position from side to side. The vessels passing through the optic nerve are normal in number; the veins, while in the retina, much and unequally dilated, of dark red colour, and pressed against the white rim, in descending become thin and of a light red colour.

“Seizing some of the transparent vitreous, and lifting it a little from the remainder, a peculiar arrangement is observed in its substance, which gives it a greater cohesion than would be the case if its different portions were unconnected; transparent films seemed stretched across the whole plane, inserting themselves on either side into the hyaloid. This portion

retains its transparency while connected with the rest of the vitreous ; but when it is excised and put on glass, it flattens out and resembles a slight gray delicate tissue, which ($\times 500$) shows the normal cells of the vitreous, surrounded by transparent fluid. The cells consist of slightly oval transparent dilatations, opening at two opposite points into narrow transparent tubes, and are found in every part of the vitreous humour. This posterior half of the eye was divided into lateral halves—the one half for dry sections, the other for the present examination.

“About twenty portions of retina and choroid have been examined ; they all resemble that described above ($\times 500$). The transparent tissue and the vessels of the choroid normal, the stellate pigment deposited in too great abundance, and in a manner frequently seen in the choroid when there is a great quantity of blood slowly circulating. The hexagonal (retinal) pigment-cells filled with deep brown granules, the greater number having lost their hexagonal arrangement as if swollen. When the retina is peeled off, the brown granules easily detached, remaining attached to the corresponding rod ends. (This state of the hexagonal cells shows very clearly the insertion of one brown granule into one rod end ; since abnormally the connexion between the granule and rod is more intimate than between the granule and its cell.) The rods and bulbs, normal in shape and transparency. In the nerve cell layer an amorphous light-gray and translucent substance (much resembling in consistence, colour, and appearance, that in the conjunctiva in “granular lids”) in irregular patches, with a quantity of brown pigment,

some of which has the shape of former vessels, so that when looking on a piece of retina from its choroidal or hyaloid surface, these gray patches are found in the nerve cell layer, interfering with its transparency, and giving the whole a grayish translucent appearance. The nerve cell layer, with its gray patches, overlaid by an exquisitely dense network of angular unequally-dilated capillaries and large vessels; their dilated state, and angular arrangement, indicating a very slow current of blood. Instead of finding on this nerve cell layer the transparent optic nerve fibres, the field is sprinkled with fine black pigment-molecules, some deposited in irregular patches, others showing most distinctly the linear arrangement of optic nerve fibres. The vessels are a little out of focus when this pigment is seen, and judging from the distance of the pigment from the vessels, it is probable there is a transparent amorphous substance which supports the pigment, and fills the space between the thickened though transparent hyaloid and the vascular layer.

“From without inwards, we have therefore, sclerotic, choroid, hexagonal layer, with round and hexagonal pigment-cells, apparently normal rods and bulbs, a grayish patchy nerve cell layer, interwoven and overlaid by an abundance of vessels, an amorphous transparent substance supporting molecules, and lastly, the thickened hyaloid. The same grayish amorphous mass which is transfused through the nerve cell layer, lines the cup, which replaces the optic papilla; capillaries of the same character as those in the retina branch on it, and the same kind of pigment, which replaces the optic nerve fibres, is spread over it. The sections made of the optic nerve

opposite the sclerotic, show the normal nerve tubes; while outside the eye, beyond the fascia cribrosa, instead of becoming transparent, some disappear at once in the amorphous lining of the cup, and the double transparent contours of others can be traced for a short distance into the mass. The optic nerve up to the fascia cribrosa, and the resisting tissues surrounding the optic papilla normal, in situ; the transparent optic papilla, and the optic nerve fibres in their further course have been destroyed (by pressure or disease) by the peculiar amorphous mass into which the nerve cell layer is transformed, or which is deposited in it, and which, accompanied by an enormous vascularity, pressed in two directions upon normal parts, inwards upon the vitreous, outwards upon the fascia cribrosa, sclerotic, etc.

“*Dried sections.* The sclerotic and choroid as before, of the retinal elements, the rods and the large vessels can be recognised: the remainder forming an amorphous yellowish mass, in which grayish parallel lines indicate an arrangement in layers; the thickening of the hyaloid well marked, lifted forwards towards the vitreous by enlarged retinal vessels. The sections of the optic nerve entrance show the normal nerve tubes which (arrived at the fascia cribrosa) disappear in the yellowish and amorphous mass which lines the cavity, replaces the optic papilla, and is also present in the nerve cell layer of the retina.

“Once familiar with the peculiar appearance of the entrance of the optic nerve, the disease can be recognized in its earliest stages, and is open to treatment. Comparing the sketch made during life with that made after excision, we are led to the following conclusions:

“1st. That the white rim, apparently forming the periphery of the cup, is due to the sclerotic advancing into it; and that the shadow, thrown up by the cup, produces the bluish-grey appearance near its edge.

“2nd. That a healthy appearance of the retina, when examined with the naked eye or with the ophthalmoscope, is compatible with these morbid changes.

“3rd. That the state of the optic papilla, in the one eye, allows, in many cases, conclusions to be drawn respecting the state of the other.

“4th. That the thickness of the layer of rods, being almost equal to that of the nerve cells, evidently shows the destruction of the latter.

“5th. That the more arterial blood the retina admits, the less it is diseased, and its substance is less easily torn.

After repeated careful examination of similar cases, from which portions of iris have been removed; no effusion of blood can be recognized in the substance of the retina, but a marked diminution of the bluish crescent in the cup.” *

MORBID CHANGES OF THE OPTIC NERVE.

Post-mortem examinations have proved that a very white and dilated appearance of the optic nerve may be regarded as a sign of fibrinous degeneration of the papilla optica. Gräfe has shown this, and gives a very interesting case examined by him: “A man who had been blind for many years,

* *Ophthalmic Hospital Reports*, January, 1858.

and having no signs of cerebral disease, the ophthalmoscope showed a tendinous white papilla, and very delicate central vessels. Death was caused by pulmonary consumption. The post-mortem showed structural change of the thalami and corpora striata. The optic nerves were atrophied, dark grey, and gelatinous, until they reached the chiasma, but from this point they degenerated into dense white fibrous cords; the papilla also consisted of tendinous tissue. Only here and there a few nerve-fibres were observed. The retina could not be satisfactorily examined, on account of the advanced stage of decomposition." *

The optic nerve is sometimes much elongated, from tumours pressing the eye-ball out of its natural situation; and, in several instances where this took place in a considerable degree, the functions of the retina continued unimpaired.

In the eye of a child two years old, a scrofulous growth was found firmly adherent to the posterior capsule of the lens, extending to, and compressing, the optic nerve at its entrance.

Paw found in the optic nerve a large hydatid, which had produced amaurosis.

Mr. Heaviside made a preparation of the optic nerve of an amaurotic eye where a tumour of considerable bulk grew from the neurilemma. Wandeler found, in a young man who had amaurosis, "a hard swelling in the optic nerve."

"Concretions have sometimes been found in the optic nerve. Walter found in the left optic nerve of a maniac, just

* Gräfe, Archiv, ii, p. 285.

before it passes through the optic foramen, a calcareous concretion, of a rounded and flattened shape, and of two lines in diameter. Morgagni found, on opening the head of a woman who had been blind, and who complained of excruciating pain in her head, "a stone, the size of a pea, in the very substance of the optic nerve."

"Ferro found the optic nerves surrounded and covered with fibrine, in a case of amaurosis, which he considered as the effects of gout.

"Lallereux found, in the middle of the substance of the optic nerve, a small tubercle, of a hard substance. This patient had been quite blind for two months; but the iris was moveable, and no change of appearance had taken place in the eye-ball. He also found, on opening the neurilemma of an optic nerve, that nearly one half of its length was converted into a liquid matter. This eye had been amaurotic, and no apparent change was observed in it during life, except a *greenish tinge* at the bottom of the globe, the iris remaining moveable. From the iris of this eye, and also that of the foregoing case, retaining its mobility, M. Lallereux drew the general conclusion, that, in those cases of amaurosis where the pupil remains moveable, the disease exists in the optic nerve; whereas, when the pupil is permanently dilated, the structure of the retina itself has become changed.

"In a man who had been blind in the right eye, the optic nerve was found of a brownish colour, and thin for about one finger's breadth from the eye. It contained no pulp, but a fluid of a viscid consistence, and of a muddy grey colour. When this fluid was squeezed out, the neurilemma remained

in the form of a tube, the sides of which were thicker than natural. Beyond this portion, the pulp was firmer, but discoloured, and the nerve thinner as far as the union of the two nerves."*

Morbid anatomy, it must be observed, fully bears out the more recent investigations of the ophthalmoscope, in patients labouring under diseased conditions of the retina, choroid, and optic nerve.

We must not look for any external signs of change in internal diseases of the eye: it is well known the external membranes are unaccompanied by redness. In choroiditis, hyperæmia of the papilla, retinitis, and detachment of the retina: indeed, the latter membrane may be the seat of apoplexy, without the exterior of the eye showing in the least any increased vascularity. In the external disease known as keratitis, redness is generally absent; hence we may deduce that redness of the eye-ball has no diagnostic value but when taken in conjunction with the anatomical and physiological signs of the inflammation of each membrane, and is always in inverse ratio to the intensity and danger of the disease, with the exception of traumatic lesions and phlegmon. If we glance at internal inflammation of the eye, we find that iritis in its early stage is unaccompanied with any very marked redness, and that amblyopia may be suspected at a time when already vision is partially destroyed.

"In disease, the retina sympathises directly with the brain through the visual tract, producing either an increased sus-

* Wardrop, op. cit.

ceptibility from excitement, or a dulness from debility and oppression. It sympathises through the involuntary tract with the par vagum in disorders of the lungs and stomach, and in a less degree with the par vagum in disorders of the heart, and part of the intestines, which are more fully supplied by the sympathetic nerve. It sympathises with the sensitive tract through the sentient nerves in disorders of the skin and conjunctiva. It sympathises least of all with the parts almost entirely supplied by the sympathetic nerve, and only through the filaments of this nerve, given to the ocular artery in common with the rest of the internal carotid supplying the brain."*

Among the labouring classes, perhaps the most frequent disease met with is a defective state of vision (*Amblyopia*), arising from over-work, and especially the fatigue of night-work by gas and candle light. This is, in some measure, owing to the impurity of the gas supplied; in almost every kind of artificial light there is an excess of the yellow ray over the violet ray, to the great injury of the sight of those obnoxious to such influences; as compositors, printers, tailors, dress-makers, &c.

That the larger proportion of the yellow rays, and great impurity of an atmosphere where numbers of work people are crowded together for hours, have much to do with the prevalence of *Amblyopia* and other eye diseases, among those employed, as before stated, by night chiefly, might have been predicated, and is fully proved by the large number of persons

* Swan, *On the Visual Powers of the Optic Nerve*.

engaged in such trades applying at our hospital for advice. On the contrary, those engaged in occupations said to provoke injury by working with a concentrated light and powerful magnifiers, such as engravers, watchmakers, and the large number of persons who, for hours together, use microscopes, very rarely complain of their eyes, and, as a rule, preserve their sight to a late period of life. This may, in some measure, be explained in this way: the latter class of persons take great care to correct the quality of the light by the various aids of tinted glasses, green paper shades, and other modern appliances.*

Another source of evil which should be guarded against, is,

* A Table showing the comparative effect of occupations in the production of Eye Diseases; compiled from the books of the Royal Westminster Ophthalmic Hospital, in an average of 6,000 cases treated during the past year:—

In-door occupations requiring close attention, but not necessarily in crowded rooms.	In-door occupations in crowded rooms or workshops.	Out-door occupations.
Artists 4	Blacksmiths.... 71	Bricklayers 45
Carvers & Gilders 8	Bootmakers 28	Carpenters 75
Copper-plate En- gravers..... 7	Clerks..... 80	Cabmen and } 71
Cutlers..... 6	Compositors... 30	Coachmen.. }
Engravers..... 15	Dressmakers... 84	Charwomen 34
Jewellers..... 10	Governesses.... 24	Labourers..... 305
Lithographic	Laundresses... 52	Porters..... 57
Printers..... 13	Machinists .. } 94	Painters 32
Opticians..... 4	Engineers ... }	
Musicians..... 10	Milliners 29	Total 619
Total 77	Total 492	
Married Women, employed in household duties and other oc- cupations not particularized.. 634		

the incautious use of spectacles, commonly sold under the name of eye-preservers, but which more often only intensify the sunlight, in as much as all blue and some green coloured glass increases the chemical action of light, and may add to the excitement of an already over-wrought or irritable retina. The only spectacles fitted for weak sight are those of *neutral-tinted* glass, without any admixture of blue.

Light, we have seen, is the agent through the medium of which external objects make their impressions on the sense of sight. We know by experience that a certain moderate amount of illumination is that by which we can see objects at once most distinctly and comfortably. Strong light pains the eyes, determines the blood to them, and confuses vision: on the other hand, to attempt to exercise the sight by too weak, or dull light, strains and fatigues the eyes, and does them much injury.

Gas, oil, or candle-light is very inferior to the mild diffused light of day. Our own feelings tell us, that work at all trying to the sight is best done by day. Students, and others, therefore, who have much reading and writing, should do so by daylight. Read by day, and write in the evening is a good rule: in liké manner, seamstresses should do dark coloured and fine work by daylight, and coarser work by candle-light. All artificial light should be bright without being dazzling. Sunlight must not be allowed to fall directly on the work, as the intense light of the sun may affect the retina, and cause congestion, or even inflammation. Never attempt to read or work by the flickering light of a fire, nor in bed by candle-light. It is very trying to the sight to read

when riding, the eyes are injuriously strained by the constant motion of the carriage.

The eyes of children at school are often too much tried, and the ground is thus laid for future weakness of sight. Exertion of sight is especially prejudicial after bodily fatigue, and during recovery from a debilitating illness. To persons already suffering from weak sight, we may add that a proper attention to the state of the skin, exerts an important influence for good or evil on the eyes. A due amount of sleep, regularity in diet, &c., the daily sponging of the skin, flannel worn next it, and garments adapted to the season: a proper regard to these and many other matters, usually called trivial, will go some way towards removing existing disease, or warding off an attack of Ophthalmia in the delicate and predisposed.

Asthenopia, or weak sightedness, is common among the class of persons before referred to. The following are the chief characteristics of this affection. In the first instance, fatigue of vision is complained of after employment of the eyes on any of the accustomed pursuits, and this may be seen, even when such employment has been in moderation; or when the eyes are hard pressed, as in trades requiring minute and long-continued exercise of vision; afterwards confusion and obscurity prevail, sometimes attended with heaviness in the head, or actual head-ache. If the occupation has been that of needle-work, the stitches can no longer be seen; if of reading, the lines seem to run into each other, and then complete indistinctness ensues. A momentary remission, either by looking at distant objects, or shutting the eyes, affords temporary relief, and the objects again become distinct.

Rest for a day or two is always attended with much benefit, and there is not necessarily great intolerance of light (*Photophobia*) ; but, in the majority of cases, a bright day is rather disagreeable, bright artificial light is trying, and sometimes the intolerance is very marked. As a rule, there is no evidence of a deranged state of the bodily functions, but general feebleness of the system is most commonly present ; and the class of persons in humble life that are most subject to asthenopia, are, above all, girls who are thin, ill fed, and lead sedentary lives, as milliners, dressmakers, &c.

In this incipient disease, general treatment with rest of the eyes is very beneficial, and the tonic plan is that which may be relied on ; and not alone tonic medicines, but the use of the cold salt-water bath. Very many cases of an affection so often seen could be quoted ; the following will serve to illustrate occasional forms of the disease.

ASTHENOPIA AND INCIPIENT CATARACT.

J. M——, a porter, aged forty-two, applied for advice on the 20th of June, 1855. The history he gave of his disease was, that, about Christmas, 1854, he first noticed a dimness of sight in the left eye ; shortly afterwards he was attacked with rheumatism, and became an inmate of a general hospital. He was soon cured of the latter disease ; but his sight continuing to grow worse, he applied to the Royal Westminster Ophthalmic Hospital.

There being no outward signs of disease, an examination was made with the ophthalmoscope. In the left eye the

whole fundus was of a very pale pink colour, and the vessels of the retina were obscured by a greyish web; the lens and vitreous perfectly clear. In the right eye the lens was split up into segments, but the divisional markings were so faint as not to be seen without the aid of the convex lens; the fundus was of a pale colour, and the vessels, as far as they could be made out, were small. His general health was not good; it was therefore thought desirable to try a tonic plan of treatment, and this was followed by the best result. The sight of the left eye was much improved at the end of three weeks; but the opacity of the lens in the right had not diminished. In this case, the cataractous disease had been entirely overlooked.

ASTHENOPIA, ANÆMIA.

CASE.—H. J——, aged fifty-two, a waiter, applied July 11th, 1855, suffering from Asthenopia. He stated that about Christmas last his sight began to fail, and is now so imperfect that he cannot follow his occupation, which is chiefly night-work in a tavern. “Advised to apply, about a month ago, to a *female oculist*, who told him the optic nerve was diseased, and nothing could be done to stop its progress. She afterwards said a cataract was forming, and put a *drop* into his eye, which was much worse after it.” This patient, a thin pale man, a widower, with several children to support, and means of subsistence very precarious, had a distressed and anxious aspect, pulse low. No objective sign of the diseased condition, except a dull and sluggish state of irides.

*Examined with ophthalmoscope:—*An anæmic condition

of the vessels of retina; fundus of a faint pink colour, remarkably small and pale, exposing a large portion of a very white papilla optica. The dioptric media perfectly clear and free from disease. Assuring him that no great amount of disease could be detected, and that he might soon expect to be cured, the compound iron mixture was prescribed: his general health improved rapidly; and I need scarcely add, that the anæmic condition of the eyes, with impaired vision, was induced by overwork, anxiety, and an insufficient diet.

MYOPIA.

“*Near Sight.*—The ophthalmoscopic signs in the greater number of young near-sighted people are the following:—The media are transparent, the entrance of the optic nerve and neighbouring parts are distinctly seen at ordinary ophthalmoscopic distance, and without using the convex lens; part of the periphery of the optic nerve entrance, generally in both eyes, is bounded by a brilliant white crescent, which, on superficial examination, appears due to an irregularity of shape of the optic nerve entrance. The situation of the crescent and its size vary—its situation may be to either side of the entrance, or, more rarely, above or below it, and generally it is symmetrically placed in relation to the optic entrances of the two eyes, the size of the crescent is proportionate to the degree of near-sight in either eye,—the smallest number of retinal vessels branch over it,—its surface and periphery are occasionally dotted with pigment. Patients in whom the crescent varies much in size in the two eyes, are apt to neglect the use of the eye that is most near-sighted, as they consider it to be

diseased ; but, in consequence of some disabling affection of the eye they make use of, and by trial of proper glasses for the neglected eye, they are made aware that it is still useful to them. Such cases require careful ophthalmoscopic examination for their diagnosis. I have not had an opportunity of dissecting an eye in which the crescent had been recognised before excision. The patients are generally above the age of 12, and under the age of 25, and relieved by the use of concave glasses, either glass being proportionate to the size of the crescent ; the larger the crescent is in any case, the greater must be the power of the glasses to be used. This crescent, and with it the short-sight, I have seen disappear in a patient after her third confinement. In another case, it lost its crescentic shape gradually, surrounded the optic nerve entrance, and had then an irregular periphery of choroidal red. The patient—a tall, sickly-looking man, aged 53, near-sighted. Three years previously he had lost vision suddenly and spontaneously in the right eye ; lately, the left beginning to be dim and painful, the blind eye was removed.

“Ophthalmoscope, R., a disease of the vitreous humour, prevented the light passing beyond the crystalline lens. L., the media transparent, the vessels and optic nerve entrance normal, the upper part of the periphery bounded by a brilliant white, flat-looking crescent, the choroid surrounding the crescent and the optic nerve entrance of a peculiar uniform pale red.

“On removing the right eye, the optic nerve was divided close to the globe, and its transparent portion probably being cupped, the fluid vitreous escaped, the globe collapsed, and the

greater part of the retina became detached. The retina, being spread on glass, its hyaloid surface showed the following appearances:—to the extent of the white patch, the nerve tubes are indistinct, and the field is dimly granular; at its edge, the nerve tubes form dark shaded bundles, which further on assume their normal appearance; the nerve cells are distinctly seen beneath the abnormal as well as the normal portion of the optic nerve fibres. The hexagonal cells to the extent of the retinal change are deficient; a few brown pigment spots are scattered over the choroid, which is transparent to the extent of the retinal defect. The connexions between retina, choroid, and sclerotic normal, the sclerotic considerably thinned, most so round the entrance of the optic nerve. The hexagonal layer and choroid, while subjacent to the transparent retina, are normal.”*

Professor F. Willebrand has employed *secale cornutum* in Asthenopia:† the remedy, in his hands, has been of the greatest advantage in disorders of the adjusting power of the eye; in which he believes the evil to be removable by recalling the brisk contractility in the walls of the blood-vessels, or in other structures furnished with unstriped muscular fibres.

He relates cases, showing the marked benefit received; and although the complaint returns, where the cause—for example, straining of the sight upon minute objects, especially in a bad light—cannot be avoided, yet it is again removed by the same means. Some young people of a ladies’ school, who, in con-

* Dr. Bader, *Ophthalmic Hospital Reports*, April, 1858.

† Archiv fur Ophthalmologie, Vierter Band, Abtheilung.
—*Medical Times*, August 28, 1858.

sequence of strained occupation in a bent position, and of ill-arranged illumination, offered several examples of considerable derangement in the adjusting power of their eyes, which yielded to this treatment. Willebrand is convinced also that, in disturbed power of adjustment, the treatment by means of convex glasses is greatly aided by internal medicine. The dose of the secale is varied according to the age of the patient : from 5 to 10 grains, mostly in combination with carbonate of magnesia ; sometimes, in chlorotic cases, with iron.

And now for a word or two on the general treatment of Amblyopic defects of vision, especially of cases seen in hospital. I find them often associated with general debility, over-work, bad-feeding, bad air, sequelæ of fever, liver complaints,* with long standing and weakening disease of other parts of the body—in a few, from masturbation and a

* “The liver should, in the physiological state, be considered as an organ destined, if I may so speak, to maintain a certain equilibrium in the blood. In fact, if you examine the blood of animals feeding on the most diversified materials, some living on animal, and some on vegetable matters, and if you analyse the blood from their heart, for example, you find that the composition of this vital fluid is in all nearly identical. These alimentary substances, then, do not enter the system either in the state or in the proportions in which they are seen in the intestine, but undergo in the liver, placed, like a living laboratory, between the intestinal canal and the general circulation, a thorough elaboration, in which there is manifested a certain equilibrium necessary for maintaining the equable composition of the blood, which is and should be endowed with the same properties in all animals, since it serves to maintain functional phenomena that are identical.”—Claude Bernard.

syphilitic taint,—many in a chronic stage; consequently more real good has been effected by the administration of alteratives, with tonics, or blood-tonics, than by any other plan of treatment; as will be seen in cases I am about to relate. I may add that, when the impairment of vision is combined with poverty of colouring matter in the blood, the value of iron can scarcely be overrated. “The blanched lip and the pale tongue of an anæmic patient challenge us to prescribe a salt of iron, because we know that element to be wanting to restore our patient to health.” Quinine with iron may be advantageously employed, and I have found arsenic in combination a valuable remedy.

TRAUMATIC NYCTALOPIA WITH OPACITY OF RETINA.

Under this head Anagnostakis writes: “I shall notice a case of the highest interest, which escaped all other means of investigation, and which, from its singularity, well deserves attention:—

“Mme. B——, age 37, of a delicate constitution, eight years since suffered from traumatic irido-choroiditis of the right eye.

“Towards the end of November, 1852, she was knocked down by a carriage and received a slight contusion upon the occiput. From the time of that accident her sight became from day to day more feeble; now she can hardly see her way about. She sees better on a gloomy day; the sun produces a painful sensation.

“The outer membranes of the eye are in a normal state.

The iris, which has its natural colour and is free from adhesions, reacts powerfully under sunlight. At the bottom of the eye, not the least alteration is to be distinguished.

“*Examined with ophthalmoscope:* With the aid of this instrument we see, at a short distance from the *papilla optica*, three scales of a cretaceous appearance, altogether about the size of a small pea, and slightly elevated above the retina; a dense capillary net-work surrounds this membrane, the principal vessels of which are very prominent and congested. It is impossible for us to give a positive opinion as to the nature of these scales; but there is no doubt that the retina has, in those places, lost its transparency.”*

TRAUMATIC AMAUROSIS.

“Mr. J. aged 32 years, of robust constitution, came to consult M. Desmarres for complete blindness of the right eye. He attributed it to a contusion which he received seven years ago from the butt-end of his own gun, and which contusion caused the total loss of sight twenty-four hours after it had been received.

* “A remarkable sparkling appearance produced by cholesterine crystals is sometimes observed in the interior of the eye. Dr. Hanover believes cholesterine is formed in the lens, and it becomes free after operation for cataract. He therefore proposes the name *cataracta scintillans*, instead of *synchysis scintillans* commonly given to the morbid state in question, from the vitreous humour, in a dissolved state, being supposed to be the original seat of the cholesterine deposit.”

“With the unassisted eye, not the least trace of crystalline opacity is perceptible, nor is there any deeper-seated alteration visible ; but with the ophthalmoscope, a small central opacity of the lens is seen, and many small opaque corpuscles are floating in the vitreous humour ; nearly the whole of the retina is the seat of serous effusion, varying in colour from a light red to a dark brown ; and some white spots with irregular edges can be seen beneath the retina. The optic nerve is in great part covered by the serous effusion.”*

In the *Frontispiece*, No. 4, is a drawing, after Ruete, which shows effusion into the retina, and diffused black patches surrounding the periphery of the optic nerve, with extravasated blood covering the *papilla optica* ; red patches are distributed throughout the upper portion of choroid, with bluish-white plastic exudations over the lower part.

The following case is given by Ruete : “A compositor, aged 38, suffering from loss of sight in his left eye, without being able to give any account of the seizure. His general health was good. The colour of the eye was normal, and there was a sluggish state of the pupil.

“*Examined with ophthalmoscope* : The retina appeared foggy, so much so that the vessels of the retina were much obscured. The papilla optica was large, having a black spot over its centre, surrounded by a grey ring, and this again by one of a lighter colour. The arteries were small, and the capillaries numerous. This case was one of exudation into

* Anagnostakis, op. cit.

the retina, associated with an anæmic condition of the optic nerve. The patient was kept under a course of quinine and iron until the affection entirely disappeared."

The next case acquires additional interest from having been seen by that able surgeon Sichel, whose written account of the changes observed coincide with a description previously given by myself to the patient.

Amblyopia. Insensibility of right retina.—J. G. having resided at Mourzouk several years, much exposed to the changes of climate peculiar to the interior of Africa, found, about fourteen months from this date (July 1st, 1855), that the sight of the right eye was gone. The only indication of the disease affecting the eye was a slight granular state of the palpebral conjunctiva. Like other persons residing in hot climates, he suffered much from an old liver complaint, and at times with bleeding piles. This evidently exerted considerable influence over the eye affection: he found, when he had a "liver attack or piles, the left eye much weakened, and the sight very dim indeed." The ophthalmoscope disclosed effusion to some extent under, at least, a portion of the retina, that membrane being in part raised and detached; it was also opaque and abnormally vascular; the vessels of the retina were large and dilated; the papilla of optic nerve could not be seen.

This gentleman had submitted himself to active treatment, under the advice of medical men, both in his own country, and on his way to this, remaining for a time in Italy for the express purpose. No good resulted therefrom, and when I saw him he was suffering from debility, and was very nervous

and in fear of total blindness. I decided first to improve his general health, and accordingly ordered him a generous diet, with tonics. In about three weeks, very small doses of the biniodide of mercury were added, and continued with benefit. During the month of August, he was obliged to go to Paris on important business, and there a friend persuaded him to consult Sichel. Upon his return to London, he called upon me, stating what he had done, at the same time showing me the opinion and prescription obtained. He said he was much alarmed when the application of leeches was insisted upon by Sichel; for this reason, that when, on a former occasion, leeches were prescribed, his sight became worse. He therefore decided to continue my treatment, from which he had already derived some benefit.

The treatment recommended by Sichel for this patient is so peculiar that I am tempted to subjoin it; although I do not believe any English practitioner will be tempted to follow out his practice.

Sichel directs the patient to apply twelve leeches before the right ear; on the following day to be purged with two glasses of citrate of magnesia; after which, to make four applications daily on the forehead and right temple with a bit, as big as a small bean, of Neapolitan ointment.* On the third day, four leeches to be applied to the anus; to take, night and morning, one of the following powders: calomel,

* This ointment is a preparation of mercury, corresponding to our mild mercurial ointment, and the therapeutic effect is about the same.

ten cent.; golden sulphuret of antimony, five cent.; carbonate of magnesia, fifty cent.; mix, and divide into ten powders or packets. After three days, suspend these medicines, and substitute the copper pomade (*Paris Pharmacopœia*) for the Neapolitan ointment, and take fasting every morning, in a little coffee, cream of tartar, fifteen gram.; carbonate of magnesia, ten gram.; after eight days, return to the use of the Neapolitan ointment and calomel powders, which finish. When these are all gone, take every second day the cream of tartar and magnesia powder as before. On the alternate days, take the barium drops, prescribed in the *Paris Pharmacopœia* (*No. 1, du 8 Août*). When the pomade Neapolitan is finished, again use several pots of the copper pomade. From time to time suspend the cream of tartar and magnesia powders, and take, morning and night, for eight days, half of one of the following powders: precipitated sulphur and cream of tartar, of each five gram.; sugar of lemon, ten gram.; mix, and divide into twenty packets. Take three times, at intervals of ten days, the citrate of magnesia purgative; and the next day apply six leeches to the anus, unless the piles should have been bleeding considerably. From time to time substitute the sulphur and cream of tartar powders; and take also from two to four of the following pills: gum ammoniacum and sulphate of potash, of each three gram.; Barbadoes aloes, one gram.; mix, and divide into fifty pills. After having used three pots of the copper pomade, commence bathing the eye five or six times a day with the following collyrium; at first, diluted with water, let fall a drop between the eyelids: distilled water, one hundred gram.; cherry laurel water, five gram.; borax,

one gram.; quince mucilage, ten gram.; mix. Subsequently, employ the following collyrium in the same way as directed before: distilled water, ten gram.; sulphate of zinc, five cent.; dissolve. Try two or three phial bottles of it; and, when it is well borne, continue the use of it twice a week, night and morning. Suspend its use at night, and put a drop of the following into the eye: distilled water, ten gram.; sulphate of copper, ten cent.: dissolve.

“The diet must be mild and moderately nourishing; no liquors, no pure wine, no coffee without milk; the same proportion of vegetables as of meat and bread. When exposed to a strong light, to wear tinted spectacles, not too near the eyes; work as little as possible; use the eyes upon distant objects, or objects partially illuminated; do not work upon small objects, or try to read small type; remove the object as far from the eyes as possible, and every few minutes look from it to a distance. If the mouth has not been affected by the use of the Neapolitan ointment and calomel, return to it after having left it off for three or four weeks. Continue the other treatment a long time, and after three months apply with a brush some blistering spirit, or a small blister about the size of a two-franc piece, to the right side of the neck and ear alternately. Let one heal up before the other is applied; after the first blister, purge again, and continue the treatment a week. Apply from time to time five or six small blisters to the right temple.”

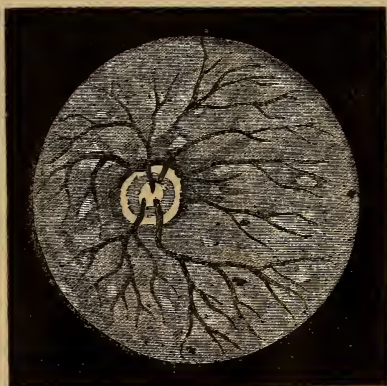
In placing this case, and others, under no special class of disease, it should be understood that I do so, because, the changes when seen, were not of that well marked character,

that one could say, without doubt, here is a case of hyperæmia, there, chronic retinitis.

AMBLYOPIA—INCOMPLETE AMAUROSIS.

Partial insensibility of retina, from effusion. (*See Fig. 3.*) S. E——, aged twenty-seven, schoolmaster, admitted July 2nd, 1855. Gradual dimness of sight came on in both eyes, so much so, that since May last he has been obliged to resort to strong magnifying glasses, which have

FIG. 3.—*Left Eye.*



Amblyopia, exposed spots in choroid.

barely enabled him to continue his duties. Being a nervous man, he suffers much from a dread of loss of sight, and is frequently troubled with headache and constipation of bowels; candle-light distresses him much, he is compelled in con-

sequence to discontinue reading at night. Pupils dilated—mydriasis; with this exception, there is nothing to indicate the existence of disease. With ophthalmoscope, the dioptric media appear perfectly clear; fundus of eyes alternately pale and red in colour, with a few irregular white patches. A pink cloud suspended as it were before the optic nerves, which partially obscure the retinae; the periphery of optic nerves, at upper two-thirds, presents an irregular outline. To take two of the Pil. Hydrarg. cum Galb. every night.

July 12th.—Improving; bowels sluggish. Continue pills, and, in addition, sulphate of magnesia, one ounce; dilute sulphuric acid, two drachms; infusion of calumba, twelve ounces, one ounce three times a day. On the 30th this patient was discharged, much improved, and able to go to the country; he has since had no return of the affection.

AMBLYOPIA, WITH CHOROIDITIS.

J. C. aged thirty-eight, shoemaker, admitted August 16th, 1855. Sight dim for the last three years; left eye particularly so. At present cannot read large print; suffers from bilious headaches and heaviness over the brow, for which he has often been under the care of a medical man; “never had very good health;” is married; smokes a good deal; eyes rather heavy and full, with great desire to sleep. Two days ago, found the sight of the left eye nearly gone.

Examined with ophthalmoscope: Choroid congested; vessels of retina varicose; entrance of optic nerve in the left eye covered over by a dark spot, which extends to foramen centrale; lens and other structures perfectly transparent. To

be cupped on nape of neck, and take three-grains blue-pill, with two grains of extract of hyoscyamus, every night; aperient draught every morning. The dose was continued for a week, with mustard plaster every night to the nape of neck, which had the effect of removing the congestion. It was then changed for two pills, every other night, of blue-pill with compound galbanum-pill, and compound rhubarb draught, in infusion of calumba, twice a day. This was continued up to the 10th of September; he was then so much better that he was able to resume his work.

AMBLYOPIA, WITH CHOROIDITIS.

E. B——, aged twenty-nine, domestic servant, admitted September 6th, 1855. This patient was of a bilio-nervous temperament; both pupils were rather contracted; slight ptosis, and quivering of left superior palpebræ. Her sight had been affected for six or seven years—sometimes more so than at others; the quivering of the eyelid began only a month since; is not subject to headache, but occasionally shooting pains through the temples; feels a great weight in the eyes, and occasionally giddy. Catamenia small in quantity and irregular, appetite bad, pulse under 70.

Examined with ophthalmoscope: Considerable congestion of the choroid and vessels of the retina, forming a complete net-work over the entrance of the optic nerve, leaving not the smallest point uncovered. To take two of the compound galbanum and blue-pills every night, with two tablespoonfuls of the following mixture three times a day: sulphate of magnesia, half an ounce; sulphate of iron, twelve grains; dilute

sulphuric acid, two drachms ; infusion of quassia, twelve ounces. Counter-irritation to the nape of neck.

October 1st.—This patient having steadily persevered with the iron, and blisters, presented herself at this date ; all urgent symptoms had then subsided, and her sight was gradually improving.

HYPERÆMIA OF THE RETINA.

“This disease,” says Desmarres, “is exceedingly common. The patients complain of an uneasy sensation in the eyes after reading or working. On commencing work, the sight is good, and remains so for a variable period ; in some, for many hours ; in others, for a few minutes only. There then supervenes a sensation of fulness and aching in the eyes, which feels hot and dry ; the eyelids also feel dry and stiff ; the sight becomes confused. If the patient be reading, the letters appear unsteady ; and if he persists, disappear altogether. In some cases there is slight temporary strabismus, and double vision. Some complain of acute pain darting through the eyeball ; others of dull pain in the situation of the frontal sinus. Slight temporary relief is obtained by rubbing and pressing the eyes ; but, as soon as work is recommenced, the symptoms return, and continue to increase. In more advanced cases, the pupil, though it does not lose its mobility, is generally much contracted ; while the eye is being used, the cornea becomes of unusual brilliancy, and is surrounded by a faint circle of sclerotic injection, which disappears after an interval of rest ; in some instances there are *muscæ volitantes* of

various colours. These symptoms disappear, and there is good vision, in cases which are not of long standing, and in which the patient gives his eyes perfect rest; but if the affection has lasted long, and especially if work have been persisted in, the impairment of sight becomes permanent; small objects cannot be distinguished clearly, and large and distant objects are seen as through a veil. Ultimately hyperæmia passes on to chronic retinitis."

E. V. aged thirty-one, admitted July 8th, 1855, states that in his left eye he has three or four deep-brown scales, and one much larger than the rest. They are enclosed in circles by day, and at night resemble spots and a network of blood; occasionally long streams of light flash over the sight. He supposes the disease to have arisen from a blow on the temple about seventeen years ago, for which cupping, leeching, and salivation, were resorted to without benefit. The ophthalmoscope shows the retinal vessels of left eye congested; these give off a circular zone of vessels, and render the entrance of the optic nerve obscure. In the right eye there is less congestion; but many vessels run over the entrance of the optic nerve, and are the cause of the web-like appearance complained of. Small doses of Ferri. Cit. with Quinine and Sulphate of Magnesia, were prescribed.

The medicine was taken regularly for three months, at which time he was enabled to return to his employment, expressing himself satisfied with the benefit received. I again examined his eyes, when the congestion had nearly disappeared, and the entrance of the optic nerve, with its vessels, was almost in a normal condition.

J. B——, aged thirty-four, a clerk, admitted September 6th, 1855. First noticed a remarkable reflection of the gas in church; saw two distinct rows about a quarter of a yard from each other. Upon making a further effort, found he could not see to read with the left eye; there was a mist immediately over the spot he looked at, and the lines, instead of appearing straight, were zigzag, and every upright object diverged from the perpendicular to the right; thus the sight became gradually more and more indistinct, until at last he could not discern objects.

Examined with ophthalmoscope: Exudation into retina, the central vessels nearly obscured by an apparently overhanging cloud or web. Ordered, blue-pill, five grains, at night; and sulphate of magnesia, half an ounce, in the morning; which treatment was occasionally discontinued, and resumed.

On the 20th of October, he says: "I can now see a considerable distance; but every object appears to be in two places, the one not so distinct as the other. I cannot yet see to read other than very large print; for instance, the heading of a newspaper. The lines are, however, much straighter than formerly." At the end of the month, he found himself, by a steady continuance of this plan of treatment, so much improved as to be able to return to his duty.

CHRONIC RETINITIS.

"In chronic retinitis, the symptoms are of the same character as in hyperæmia, but more strongly marked. The

uneasiness and aching in the eye are much more troublesome ; frequently the pain is severe ; in many cases there is violent headache. The vision has lost its clearness ; small or distant objects, in particular, are no longer sharply defined. The field of vision is sometimes encroached upon in various directions. Light is unpleasant, and the patient finds comfort in the shade. The sight fluctuates much and rapidly, sometimes it is lost altogether for a few minutes. Most patients complain of a haze or fog before the eyes, which may increase in density until the sight is destroyed. In some, any sudden concussion of the body—as produced, for instance, by stumbling, coughing, or sneezing—produces flashes of light, as if the eyes had received a blow ; others see brightly-coloured spectra, in the form of rings, spots, &c. If not checked by suitable treatment, exacerbations take place from time to time, the retina gradually loses its sensibility, false membranes are deposited on its surface, and vision is destroyed.

“Ophthalmoscopic Appearances.”—At the first glance we see that the optic nerve is not in its normal condition, and that the fundus of the eye in its immediate neighbourhood has undergone some change in colour. In very slight cases, a little bit of the margin of the disc is concealed by a fasciculus of vessels, such as are seen in pustular ophthalmia, the apex pointing towards the centre, the base stretching over the retina. In more advanced cases, one-half or more of the papilla may be concealed ; in confirmed cases, the whole of the papilla is so covered that it requires some attention to make it out ; its situation can always be discovered by the converging point of the central veins and arteries, which retain their distinctness ;

but it is frequently very difficult to trace any part of its circumference. The retina may preserve its natural appearance, but occasionally we find an ill-defined spot in which the colour has become somewhat changed and brightened, the hue being yellowish red, with a slight glaze of a bluish or greenish tint. The region of the *macula lutea* is generally reddish.

“ In the stage of chronic retinitis, it has been pointed out, among others, by Dr. E. Jaeger—that in some cases the fundus of the eye seems to reflect less light than usual ; to a practised eye it appears to resemble some of those cases in which the vitreous humour has lost a little of its transparency, with this difference, that in such cases the cloudiness is uniformly spread over the whole of the eye ; whereas, in retinitis, it is confined to the vicinity of the optic nerve. The cause of this phenomenon is, probably, that the colour of the fundus of the eye is changed ; that, instead of being, as in health, of an orange red, it has assumed a blood-red hue, especially around the optic disc, and that this more sombre colour reflects less light.

“ The optic papilla is covered with vessels, its circumference indistinct, often completely concealed. The central arteries and veins are larger than in health ; between them may be seen innumerable short, nearly straight, radiating vessels, which give to the fundus of the eye the blood-red hue above alluded to. In this universal sombre colour, the larger vessels are frequently lost, as though covered by the surrounding tissues, and the whole fundus of the eye has a confused appearance. On examining the central part of the eye by means of the direct image, short radiating lines may be seen

in the retina, in the vicinity of which the texture of the membrane appears more firm than usual. These are lost, after a short course, in the general red of the rest of the eye; they are rare near the *macula*, more numerous above and to the inner side of the optic papilla. Such are the characteristics of uncomplicated retinitis; but in a great many cases it will be found to be associated, more or less, with choroiditis: in such instances, maceration and accumulations of the pigment, white spots, sub-retinal ecchymosis, floating particles in the vitreous humour, and other symptoms of choroiditis, will, one or all of them, indicate its presence."

CHRONIC RETINITIS, DETACHED RETINA.

(*Figs. 4 and 5*).—Eliza A——, age thirty-nine, married, has always had good health and sight until twelve years ago, when a rash, which she said looked like measles, broke out over her body; she had also a sore throat, this was bad enough to prevent swallowing; but does not remember having had any pain or redness in the eyes. She soon after discovered *muscæ* in her left eye, which moved up and down like little specks of soot; and found also, when reading, that the letters appeared to be on one side. A short time after, a semi-transparent blue veil, about the size of a shilling, appeared in the left eye, which partially obscured vision when she looked at anything, but was not sufficiently dense to preclude her reading moderate-sized type. The sight of this eye has lately become worse, so that now, on looking straight forward, she loses objects immediately in the axis of vision,

and anything situated at the outer side she can barely see well enough to recognise. The right eye was healthy the last week in Nov. ; then she felt some slight shooting pains through it, but did not discover any diminution of sight until three days ago (Dec. 19th), when she found it so dim she could not read the newspaper. This patient had several miscarriages, and three healthy living children, during the last twelve years. Before the sight of her left eye failed, she often noticed flashes of fire upon closing her eyes.

Examined with ophthalmoscope.—Left eye, cornea, lens, and humours clear ; over the entrance of the optic nerve a brownish, dull-yellow tint ; vessels distinct, though small. Near the yellow spot, foramen centrale, is a patch rather larger in size than the optice nerve, the ground of which

FIG. 4.—*Right Eye.*



Hemiopia, with detached retina.

FIG. 5.—*Left Eye.*

Amblyopia, exudation on the retina.

resembles that of the optic nerve; but in several parts fragments of brown and black pigment can be seen; the margin of the large patch appears of a deep brownish-red. There are also some bright-red streaks running parallel to one another at the inferior portion. The whole of the fundus of the eye has a brownish-red cast; the vessels of retina are distinct, though smaller than in the healthy eye. Right eye, humours clear; optic nerve much the same in appearance as the left; the fundus of the eye is of a brownish colour, with a white floating membrane in the vitreous; over the yellow spot is a fixed dark spot. The vessels of the retina are small, and not so distinct as in the left eye.

Dec. 30th, 1856.—Can now read large print only with the right eye, if she look down with the left eye; but says that, when looking for a moment or two, a *spot*, the size of a

threepenny piece, appears to come over the sight and cover what she is looking at, which does not, however, entirely obscure the type, but renders it indistinct. States that she was subject to bleeding at the nose when she was suckling; and when she menstruated, the bleeding was more severe. The epistaxis has ceased about twelve months. Bichloride of mercury and decoction of cinchona mixture prescribed, which she continued to take until January 16th, 1857; a slight diarrhœa then set in, when this medicine was changed for small doses of mercury with chalk every alternate night, and compound rhubarb mixture twice a day.

Feb. 2nd, 1857.—Improving; examined with ophthalmoscope; the black spot is not quite so large, but a large quantity of pigment still obscures the vessels in the left eye; the right improving.

9th.—*Examined with ophthalmoscope.*—Right eye still improving; can see better; left optic nerve clearer, and freer from spots. Catamenia scanty. Ordered compound iron mixture, one ounce, twice a day.

25th.—Improving. Since returned to the country.

CHRONIC RETINITIS.

A. B——, age twenty-nine, law-clerk, applied to me June 29th, 1855; insensibility of the retina of left eye. A thin, tall, pale-looking, nervous man. During several months past, his eye has given him much annoyance; at present time he cannot see to read or write with it; general health tolerably good, but frequently suffers from bilious attacks.

The iris of left eye slightly differs in colour; the lens by daylight appeared opaque, but upon making an examination with the ophthalmoscope, it was seen to be perfectly clear; the colour was evidently due to congestion behind the lens; the vessels of the retina irregular, and so much congested as to conceal the entrance of the optic nerve; serous patches between choroid and retina. Pil. Hydrargyri with aperient draughts were ordered daily. Under this treatment he improved; tonics were then prescribed for a fortnight, and at the end of a month, he was able to resume his occupation.

This case is of value as showing the use of the ophthalmoscope in deciding the question of opacity of the lens, and enabling us at once to direct attention to the seat of disease; hence the favourable result. I have lately seen this patient; who has had no return of the affection, but has carefully followed the advice given him as regards resting the eyes as much as possible, and attending to his general health.

CHRONIC RETINITIS.

R. R——, age fifty-three, a cook, applied on 20th July, 1855. She says her sight began to fail about two years ago, but was able to do needlework until very lately; suffers from headaches and bilious attacks, which always increase the dulness of sight. General health not very good, catamenia ceased ten years since; has now a web over the right eye, which increases in size; pain over the brow and head comes on every night; never had rheumatism.

Examined with ophthalmoscope.—The retinal vessels much congested; a thick net-work of capillaries obscures the optic nerve. Left eye is less congested than the right; a few grey striæ are floating about in both eyes; lenses clear.

Ordered a powder every night, containing two grains of grey powder, with five of Dover's powder, to be followed by an aperient draught in the morning. A blister to the neck. Effect of the mercury to be kept up with a mixture of biniodide in decoction of bark; at the end of two months, she left the hospital, improved, and has since, by the aid of tonics, quite recovered.

PLASTIC EXUDATIONS ON THE RETINA.

“In describing the ophthalmoscopic appearances of choroïditis, we mentioned the frequent occurrence of plastic exudations on the surface of the retina in cases in which this membrane has participated in the inflammation. They are distinguished from the white spots of the atrophied choroid by their shape, which is generally elongated and narrow, forming irregular bands, or, sometimes, fine white lines along the course of the vessels; by their colour, which has a greenish or bluish shade, instead of the silvery white of the choroidal spots; by the disposition of such of the retinal vessels as may pass their situation; these cross unchanged the choroidal spots, but are covered and concealed by the exuded matter. Where the deposit is recent and scanty, it forms a fine bluish glaze over the surface of the retina.”

ŒDEMA OF THE RETINA.

“ Œdema of the retina indicates some disturbance in the circulation of the membrane, as does serous chemosis in that of the conjunctiva. The fundus of the eye is pale, and the retina appears as if raised in the form of a wall around the optic papilla. There is a yellowish tinge of the retina, which renders it less brilliant than in the healthy state. It is easily distinguished, after a few observations, from turbidity of the vitreous humour.

Case.—E. W. aged 19, resident in a low, marshy part of the country, had suffered for many months from amenorrhœa, with anæmia, intercostal neuralgia, palpitation, &c. She was then attacked with intermittent supra-orbital neuralgia; and shortly after, the sight of the right eye suddenly failed, “everything being concealed as if by snow.” She had not seen any muscæ nor any flashes of light. There was no external appearance of disease. With the ophthalmoscope, the fundus of the eye was found to be unusually pale, and the retina appeared as if infiltrated with fluid: in fact, it very much resembled serous chemosis as it occurs in the conjunctiva. At the first glance, I confess to have mistaken it for turbidity of the vitreous humour; but more attentive observation, and the fact that the retinal vessels were clearly visible, demonstrated the true nature of the case. The œdema was greatest round the optic disc. It appeared to be connected with congestion of the choroid. She completely recovered in about six weeks.”*

* “*M. Desmarres' Traité des Maladies des Yeux.*”

ŒDEMA OF THE RETINA.

James G. age 19, mariner, applied January 16th, 1857. Sight defective when a boy; in consequence, recommended to take to a sea-faring life. The last twelve months, been getting worse, dark specs and a web continually before his eyes; can only make out large objects, cannot read large print, general health good; a drop of atropine applied to the eyes two days before he came to me, increased the confusion of vision, very much so in right eye. A dull light suits him best.

Examined with ophthalmoscope. — Dioptric apparatus clear; optic nerve somewhat exposed, with a pinkish-grey inner ring nearly surrounding papilla optica, patches of pigment, and vessels large and irregular. The fundus has a mottled appearance, apparently from deficiency of pigment (*Fig. 6*). A few patches darker in colour than the rest; no

FIG. 6.—*Right Eye.*

Œdema of retina.

spots or specs to be seen, either floating or fixed, in the vitreous.*

He could not be persuaded to give up his employment, or take rest. A tonic plan of treatment was ordered, small doses of ferri iodid. with quinine, and continued for a month.

Feb. 19th.—Was much improved, and wished to have his medicine continued; and when last seen, said he scarcely felt any inconvenience from an imperfection formerly so troublesome to him.

CEDEMA OF THE RETINA.

John M. age 23, a discharged soldier, applied February 4th, 1857. Served several years in India during the war, and, on his return, entered the Land Transport Corps for the Crimea; was there hard worked, and constantly employed in writing and keeping the journal; smoked a great deal, but never lived fast. When he returned to this country, the corps was disbanded, and he was discharged. His sight, which during the latter part of his service was growing dim, became very imperfect, and he can now scarcely see the largest print on the hospital letter.

Examined with ophthalmoscope.—A grey ring occupies

* Can deficient pigment in any way be connected with the fact, that such patients not only prefer, but often see better in a dull light, or twilight? We know that in some animals, which seek their prey during night, the choroid is destitute of pigment, or rather has white pigment in place of black; this appears to increase the action of luminous rays upon the retina, and, together with the greater dilatation of the pupil, increases their power of vision.

the central part of the optic nerve in the right eye, the peripheral margin of which is very irregular. Retinal vessels small, and appear to be pushed forward towards the vitreous body (*Fig. 7*). The man is very pallid and nervous, and much dejected about his present impoverished condition; he is also badly clothed, and ill fed.

Under a tonic plan of treatment, he began to improve; but country employment offering, he accepted it, and left the hospital.

FIG. 7.—*Right Eye.*



Partial insensibility of retina.

In a large number of cases which present themselves to the surgeon at a public hospital, it is not to be supposed that any plan of treatment will be attended with more than an average amount of success: I subjoin an extract of twenty cases reported upon by myself, and presented to the late Mr. Guthrie, during the three months, October, November, and December, of 1855:—

No.	Sex.	Nature of disease as diagnosed with the ophthalmoscope.	Result.
1	Male.	Effusion retinal, optic nerve nearly obscured by a dark red cloud.	Cured.
2	Male.	Congestion of choroid, with muscæ in vitreous.	Much relieved, and able to resume work.
3	Male.	Anæmic state of the retinoid vessels, loss of sight from nervousness.	Cured.
4	Female.	Effusion, striæ in vitreous body, hyaloid membrane free, anæmia occasioned by large local blood-letting.	Partial relief.
5	Female.	Congestion of choroid and retinal vessels, muscæ in small patches throughout vitreous body.	Some relief obtained.
6	Male.	Traumatic injury producing congestion of retina and blindness of right eye.	Relieved; partial restoration of sight.
7	Male.	Loss of sensibility of retina, anæmia, with nervous debility.	Cured.
8	Female.	Loss of sensibility of retina, with congestion of retinal vessels.	Much relieved.
9	Female.	Effusion, general congestion, with pigment exposed around periphery of optic nerve.	Relieved.
10	Male.	A fixed spot over foramen centrale, general debility, anæmia.	Partial relief.
11	Female.	Muscæ, large masses floating in vitreous, anæmic state of retinal vessels.	Much improved.
12	Male.	Congestion of choroid, with loss of sensibility of retina in one eye only.	Nearly well when discharged.
13	Female.	Traumatic congestion, loss of sensibility of retina, hæmorrhagic spot covering foramen centrale, fissure of capsule of lens.	Sight not relieved, lens more opaque.
14	Male.	Loss of sensibility of retina, congestion of retinal vessels; probable cause excessive use of tobacco.	Much improved.
15	Male.	Congestion of choroid and retinal vessels, with partial ptosis.	Congestion relieved, ptosis persistent.
16	Male.	Loss of sensibility of retina, with muscæ floating.	Much relieved, although the muscæ remain.
17	Female.	Atrophy of vessels, small patches of pigment around optic nerve, general anæmia.	Improving
18	Female.	Muscæ, small particles, greyish and numerous, fixed and floating; partial loss of sensibility of retina.	Much relieved.
19	Male.	Traumatic congestion, total loss of sensibility of retina from a fall on right side.*	Vision totally lost of right eye; not at all relieved.
20	Male.	Anæmia, with total insensibility of right eye, and partial of left. This patient has always suffered from colour blindness.	Not at all relieved.

* Traumatic congestion from so slight an injury is not often attended with total loss of sight. During the early part of the same year, 1855, three cases of loss of sight came under treatment from the throwing of snow-balls: the sight was perfectly restored in a fortnight in one; the others remained three weeks under treatment.

Congenital Amaurosis.—A few cases only, of this disease, have fallen under my notice, mostly affecting very young children, and arising from defective development of the nervous apparatus and choroidal coat. The first symptom that directs the attention of parents or nurses to the disease is a peculiar rolling motion of the eyes; it is then observed not to follow objects passing before, such as the light of a candle, &c. In the usual way, no change is seen; but when the eyes are examined with the ophthalmoscope, the fundus is found to be very pale, owing to deficiency of the pigmental colouring matter; the optic disc is very large and white, with vessels passing out, small, irregular, and tortuous in their character.

By attention to the general health, and the child being placed in the most favourable conditions to secure this, I have seen much improvement take place: in one case especially, after the period of teething was passed; during which time much cerebral irritation existed and was successfully treated.

I have abstained from entering on Chromatopsy, colour-blindness, and a few other forms of disease in which the ophthalmoscope will be found useful. My desire is to pursue my investigations further before I submit the results to the profession. Nevertheless, I trust the proofs adduced—supported as they are by the investigations and opinions of many eminent practitioners—of the value of this instrument, will ere long find it a place side by side with the stethoscope, and like it become a never-failing aid in diagnosing diseases which have heretofore been a source of much anxiety to the surgeon.

INDEX.

	PAGE.
Amblyopia - - - - -	68, 118, 122
—— with Choroiditis - - - - -	123
—— Congestive - - - - -	118
Amaurosis - - - - -	68
—— Congenital - - - - -	141
—— Traumatic - - - - -	116
Asthenopia - - - - -	57
—— with Anæmia - - - - -	110
—— with Cataract - - - - -	109
Atropia - - - - -	14
Belladonna, its Action - - - - -	15
Cataract - - - - -	22
—— Mr. Jordan on - - - - -	29
Choroiditis - - - - -	75
Choroid, Hyperæmia of - - - - -	82
—— white spaces in - - - - -	76
Cumming's Mode of Examining the Eye - - - - -	4
Cysticercus - - - - -	48
Cornea, changes in - - - - -	21
Glaucoma - - - - -	54
—— Dr. Mackenzie on - - - - -	55, 64
—— Gräfe's Operation for - - - - -	60
—— Morbid Anatomy of - - - - -	62

	PAGE.
Hemiopia - - - - -	39
—— with Detached Retina - - - - -	130
Hyperæmia of Choroid - - - - -	82
—— of Retina - - - - -	125
Hydrophthalmia - - - - -	80
—— with Choroiditis - - - - -	81
Iridectomy - - - - -	65
Lens, the - - - - -	21
Myopia - - - - -	111
Myodesopia - - - - -	37
Musæ Volitantes - - - - -	37
Mackenzie on Cataract - - - - -	25
—— on Glaucoma - - - - -	64
Nyctalopia - - - - -	44, 115
Optic Nerve, Changes in - - - - -	101
Overcrowded Work-rooms - - - - -	105
Ophthalmoscope described - - - - -	8
—— its Application explained - - - - -	9
—— the Normal Eye seen with it - - - - -	12
—— Opinions various on the - - - - -	18
Retinitis, Chronic - - - - -	126
Retina, Anatomy of - - - - -	85
—— Exudations in - - - - -	135
—— Edema of - - - - -	136, 137, 138
—— Softening of - - - - -	94
—— Hyperæmia of - - - - -	125
Sclero-Choroiditis - - - - -	78
Tyndal, Dr. on the Humours of the Eye - - - - -	90
Vitreous Body and its Diseases - - - - -	30

FINIS.

J. MALLETT, PRINTER, WARDOUR STREET, LONDON.

Third Edition, with 500 Illustrations and numerous Additions,
price 6s. 6d.

THE MICROSCOPE;

Its History, Construction, and Application.

BY

JABEZ HOGG,

AUTHOR OF "ELEMENTS OF NATURAL PHILOSOPHY," ETC.;
SURGEON TO THE ROYAL OPHTHALMIC HOSPITAL,
CHARING CROSS.

"We consider that Mr. Hogg has performed the most essential service to science and civilisation by bringing before the public this valuable work in a cheap and attractive form."—*Morning Herald*, January, 1858.

"Mr. Hogg's is the most complete work that has appeared in a popular shape in connexion with the microscope, and it should be in the hands of all who wish to make themselves thoroughly conversant with the uses of this valuable instrument."—*Morning Post*, January, 1858.

"If the number of copies sold be any indication of the merits of a work—and we consider that it is one of the best and most severe tests—that of Mr. Hogg is eminently meritorious. In an exceedingly short space of time it has passed through three editions, each of 5,000 copies. The experienced microscopist will find in it not only much that is new to him, but hundreds of descriptions and engravings of objects that, some time or other, have occupied his attention, whilst the general reader will find in it much instructive information. Altogether it is a deservedly popular work, and one which should be found on the shelves of every well-furnished library."—*Lancet*, January, 1858.

"Mr. Hogg's work has, in our eyes, an especial recommendation, and that is the wholesome religious spirit which pervades it. * * * * * We cordially recommend Mr. Hogg's excellent and cheap manual to all who desire to become practically acquainted with the microscope."—*Chemist*, January, 1858.

London: G. ROUTLEDGE and Co., Farringdon Street.

Harvard University
Library of
The Medical School
and
The School of Public Health



The Gift of

DR. CHARLES A. OLIVER.

